BEEF PRODUCTION IN THE ATLANTIC PROVINCES

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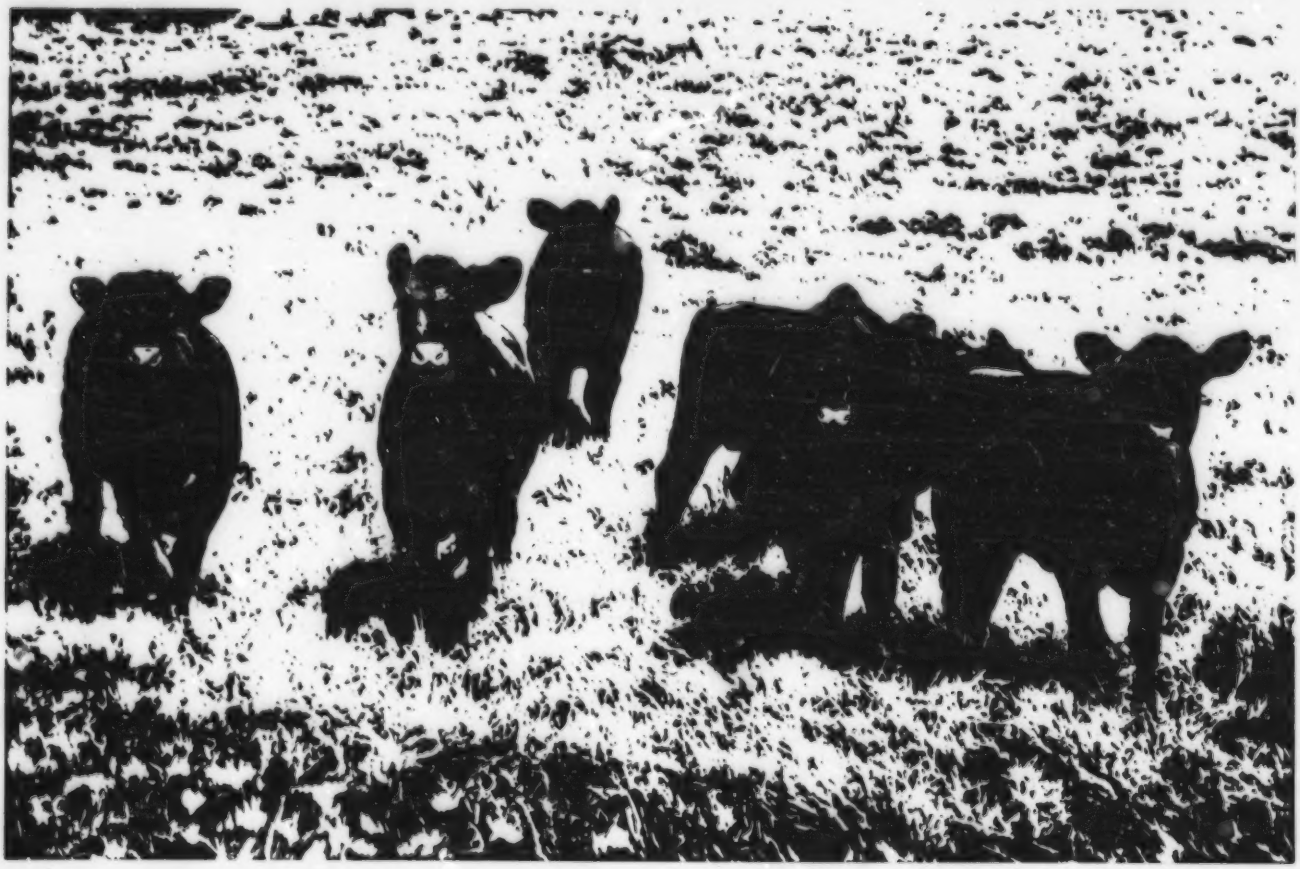

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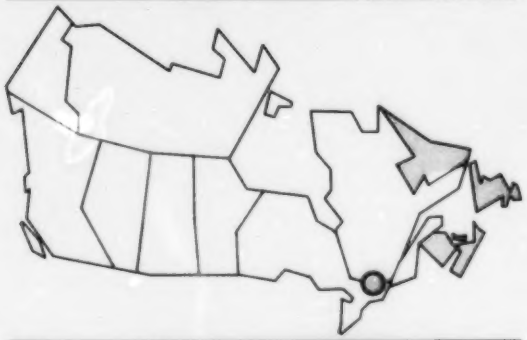

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BEEF PRODUCTION IN THE ATLANTIC PROVINCES

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FOREWORD

This publication summarizes some of the management practices recommended for profitable beef production. It includes information on cow-calf enterprises and on finishing feeder cattle for slaughter.

Feeding and management programs for beef production can take many forms and must be modified for each operation to make the most of all natural advantages. It is hoped that the general recommendations given here will help each operator make such decisions for his enterprise. Detailed advice and specific recommendations can be obtained from extension specialists with the provincial departments of agriculture and from research stations and Production and Marketing Branch personnel of the Canada Department of Agriculture.

BEEF PRODUCTION IN THE ATLANTIC PROVINCES

Beef production has long been part of the agricultural industry in the Atlantic Provinces. Most beef operations are small scale and carried on as a part of the general farm operation or as a supplement to off-farm employment. There is a growing trend towards the establishment of larger operations, particularly where by-products from other enterprises are available.

The Atlantic Provinces possess many natural advantages for beef production. Land is relatively cheap in many areas; the climate is relatively mild, so that elaborate shelter is not required for beef cattle; and the normally adequate rainfall is well distributed through the year, resulting in good crops of forage and pasture. Harvesting forage by traditional hay-making methods, although still common, is risky because of the weather and there is a trend towards barn-drying hay and making silage. Corn silage is increasing rapidly in areas suited to its production.

Dairy cow numbers have declined rapidly during the last 20 years. As a result many former dairy farms are left with buildings, machinery, land, feed and, often, underutilized labor which can readily be diverted to the production of beef.

More beef is consumed in Eastern Canada than is produced in the area. Packing plants already established can process more beef than they now receive from local suppliers. The amount of beef produced as a by-product of the dairy industry is declining. This means that markets exist close at hand for an expanded beef industry, which would also create more jobs on farms and in related supply services such as trucking and meat processing.

Each year much potential livestock feed is wasted, for example, straw, cull potatoes, waste from fruit and vegetable processing plants, and spent grains from

Figure 1. Marshlands around the Bay of Fundy are an example of the Atlantic Provinces' productive grasslands.

distilleries and breweries. Properly supplemented, these products can compose the main part of beef cattle rations. The potential for increased beef production can be illustrated by considering cull potatoes. It is estimated that 300,000,000 lb of cull potatoes are produced each year in New Brunswick and Prince Edward Island alone, and potato processing plants contribute 150,000,000 lb or more of processing waste. This is sufficient to supply the high energy feeds needed to winter 50,000 fattening steers.

The Atlantic Provinces have the resources to support a much larger beef industry; we have advantages over other areas of Canada in cost of land, mild climate and ample, well-distributed rainfall; and we have a market close at hand. In spite of these advantages, the beef industry is not expanding rapidly in many areas. It is difficult to produce budgets that show high returns on capital invested, labor and management from beef production, based on average herd performance. The same is true for other beef-producing areas in Canada. However, beef production often represents the only feasible use for existing resources of land, buildings, machinery and family labor. The possibility of long-term appreciation in land values is another factor not usually considered in evaluating the returns on a beef enterprise.

The beef industry has not been subject to the violent fluctuations in supply and prices found in some other segments of the livestock industry. This facilitates long-range planning. The producer who follows good husbandry practices and is quick to adopt new developments, so that he achieves above-average performance, can expect reasonable economic return.

COW-CALF PROGRAMS

Cow-calf production falls into several different categories. The three major ones are:

BREEDING STOCK PRODUCTION

In the production of breeding stock, the operator maintains a purebred foundation herd and often has calves born throughout the year. As a rule, the calves are

Figure 2. A calf from every cow is the goal.

weaned at 6 months and fed through to 18 months of age for sale as bulls and bred heifers. There will be a continuing demand for this type of operation as the number of beef cattle in the area continues to increase.

FEEDER PRODUCTION

This is the most common form of commercial herd based on grade or crossbred cows. The breeding season is usually restricted to a 2- or 3-month period so that all calves are about the same age. Spring calving is most common. The calves vary in weight from 600 lb down to 300 lb at weaning, depending on calving date and feeding level. The value of the calf, depends on its weight; therefore, to maximize the returns per cow, you must try for maximum weight per calf. The advantages and disadvantages of calving at different times of the year are discussed in a later section.

STOCKER PRODUCTION

The production of stockers is quite similar to the production of feeder calves except that the calves are kept over the winter and sold in the spring when they weigh about 700 lb. It is important that calves being overwintered are fed sufficient feed to keep them gaining 1 to 1.5 lb per day.

GOALS FOR A COW-CALF ENTERPRISE

The overall goal for beef cow herds should be the production of the greatest possible number of calves, with the heaviest possible weaning weights, for the least possible cost.

To do this, you should have economical facilities, and equipment that is adequate for a cow herd. Also, you should use the best cropping practices to produce economical pasture and roughage. Beef cow herds should make efficient use of any available inexpensive roughages. In the Atlantic Provinces, this would probably be hay and silage with pasture as the summer feeding program. For most efficient feeding you should aim to meet the minimum nutrient requirements and not overfeed the herd. Overfeeding raises costs and underfeeding lowers performance.

Some specific goals for a cow-calf operation are:

- Wean a 95% calf crop expressed as a percentage of cows overwintered.
- Wean calves weighing at least 550 lb.
- Produce quality calves that will produce quality carcasses.

EFFECTS OF CALF-CROP PERCENTAGE ON RETURNS PER COW

The main determinant of profit for a cow-calf operation is the pounds of calf that you have to sell for each cow maintained in the herd. Present operations are producing calves in the 425-lb range. Through proper management and new technology, average weaning weights can be increased to 575 lb. Table 1 (page 10) illustrates the effect of calf-crop percentage and price levels on the average returns per cow. It illustrates quite clearly how an increased calf-crop percentage can increase these returns.

CARE OF BREEDING HERD

To ensure that cows return to heat soon after calving and settle when bred, they must be well fed between calving and breeding. This is the time when the cows' nutrient requirements are at a peak. Spring-calving cows that start the winter in good condition can be fed so that they lose up to 10% of their weight between fall and calving, provided they are well fed after calving. Cows are most fertile when they are gaining in condition. Cows should be checked for pregnancy when the calves are weaned. It is not profitable to keep barren cows over winter.

AGE TO BREED BEEF HEIFERS

As a general rule, heifers first come into heat at about a year of age and will continue to come into heat approximately every 21 days until conception takes place. In the production of feeder cattle, it is desirable to have the entire cow herd calve within a short period of time. The age to breed heifers depends on their growth and development. Heifers calving at 2 years old should be well fed through gestation and lactation. When given proper care, they will remain regular breeders until 10 or 12 years old and in some cases even older. If heifers calving at 2 years old are not well fed during their first lactation, they may not return to heat until late in the breeding season. To be sure that heifers entering the herd become early calving cows, some breeders prefer to have their 2-year-olds calve a month ahead of the main herd.

TABLE 1. THE EFFECT OF CALF-CROP PERCENTAGE ON RETURNS PER COW

A. Assuming an Average Weaning Weight of 425 lb.

Calf-crop	Lb calf weaned	Value of calf/cow			
%	/cow	40¢	50¢	60¢	70¢
100	425	170.00	212.50	255.00	297.50
95	404	161.60	202.00	242.40	282.80
90	382	152.80	191.00	229.20	267.40
85	361	144.40	180.50	216.60	252.70
80	340	136.00	170.00	204.00	238.00
75	319	127.60	159.50	191.40	223.30
70	298	119.20	149.00	178.80	208.60

B. Assuming an Average Weaning Weight of 575 lb.

Calf-crop	Lb calf weaned	Value of calf/cow			
%	/cow	40¢	50¢	60¢	70¢
100	575	230.00	287.50	345.00	402.50
95	546	218.40	273.00	327.60	382.20
90	517	206.80	258.50	310.20	361.90
85	489	195.60	244.50	293.40	342.30
80	460	184.00	230.00	276.00	322.00
75	431	172.00	215.50	258.60	301.70
70	402	160.80	201.00	241.20	281.40

BREEDING SEASON AND TIME OF CALVING

The commercial producer must decide whether he is going to breed for fall, winter or spring calves.

It is important to plan for a uniform group of calves to sell or feed out to market. From a management standpoint, calves should be dropped within a 2- to 3-month period.

Commercial producers selling calves in the fall as feeders must plan for winter-born calves. Work carried out at the Nappan, N.S., Experimental Farm proved that early calves (January – February) will weigh 90 lb more than late (April-June) calves at weaning. Early calves will increase net returns for some extra expenditures in facilities, labor, and feed.

Early calves have less scour problems, benefit from spring milk increases and make better use of pastures. If facilities are available, early calving is profitable. Unless cows are completely confined, calving should be avoided in the early spring when changeable weather and wet, muddy conditions cause added stress.

Spring calves offer the advantage of costing less to produce in terms of feed and labor costs. Cows are also bred on pasture when nutritional level and conception rates are usually high. The main disadvantage is a lighter calf in the fall, resulting in lower net profits if the calf is sold at this time.

In producing fall calves, cows are in better condition for calving. Calves are born in a season free of flies and heat. Labor is often more available during the winter and can be used to better advantage. Calves are sold at a more favorable time during the next spring when prices are higher. The big disadvantage to fall calving is the cost of extra feed for both cow and calf. Better facilities are required and fewer cows can be kept on a given feed supply.

Most beef producers who are selling feeder calves in the fall would be advised to follow a program of late winter calving.

NUMBER OF COWS PER BULL

A bull should be at least 15 months old and well grown before being used, and then only on from 15 to 20 cows. For pasture breeding a bull should be at least 2 years

old. If a younger bull must be used, he should be kept away from the herd, given special care and permitted to serve the cows as they appear in heat. When hand mating is practiced, a 2-year-old bull may be used on from 30 to 35 cows and a 3-year-old bull may be used on from 40 to 50 cows during the breeding season. If pasture mating is practiced, these numbers should be reduced by about one third.

ARTIFICIAL INSEMINATION

Production-proven sires of all breeds are available to even the smallest herd through artificial insemination. Charges for A.I. service are reasonable and compare very favorably with the cost of keeping a bull, especially when quality of the bulls is considered.

One of the problems in using A.I. is the difficulty of detecting estrus (heat) in beef cows. This can be facilitated by running a late-castrated steer or a vasectomized bull with the herd and observing during early morning and late afternoon. It is usually desirable to breed during the season when the cows are confined, to reduce the labor involved in catching the cows for service. This means that a higher level of winter feeding may be required to ensure that the cows show heat within 3 months of calving. Many breeders use A.I. for the first 6 weeks of the breeding season and then turn in a bull to breed any cows still not in calf.

CROSSBREEDING

Knowledge of the potential benefits of crossbreeding has increased tremendously in recent years. Continuing study is showing greater economic returns than early work had promised.

In addition, buyers' attitudes towards crossbreds are changing. Feeders have learned that crossbreds do well in feedlots. Packers frequently find that carcasses from crossbreds are superior.

Crossbreeding is no miracle in itself. It won't make poor cattle good, though improved performance can be achieved. Basic improvement of the beef animal must come from the straightbred herds where accurate

Figure 3. Crossbreeding results in faster gaining calves.

selection for given traits is more certain. In short, *crossbreeding emphasizes, rather than diminishes, the importance of purebred foundation stock.*

Crossbreeding promotes hybrid vigor, crossbred females are usually growthier and become better mothers than straightbred stock. Crossbreeds show improved conception, increased livability and, consequently, higher percentage calf crops.

Recent findings indicate that three-breed rotational crossbreeding programs can be managed with little maneuvering of breeding stock and still achieve the maximum benefits. For example, heifers from a cross between breeds A and B are bred to bulls from breed C. The heifers from this cross are bred to bulls from breed A, and these heifers are bred to bulls from breed B. Then, bulls from breed C are used again and the cycle is repeated.

There are two drawbacks to the practice: first, two or more sires, each representing a different breed, must be available for at least part of each cycle; and second, color pattern, an important consideration with some buyers, is broken. Alternatively, crossbred replacement females can be purchased and all heifer, as well as steer, calves sold. This program can be applied in areas where dairy herds can be a source of beef-dairy crossbred heifers to maintain the breeding herd.

Recently, much interest has been focused on the European breeds of cattle (often referred to as exotic breeds) being introduced into Canada as sires of terminal cross calves, that is, those intended for slaughter. Calves from these breeds tend to be larger at birth and calving difficulties can be severe with young cows or small cows. However, because of the large mature size of the exotic breeds the calves grow rapidly and efficiently to market weights. The use of a beef-dairy crossbred cow as the dam of these rapidly growing calves is popular as she produces more milk than most of our traditional beef-breed cows.

BEEF CATTLE PERFORMANCE TESTING

Breeding for rapid growth is the greatest challenge in the beef business. Proper selection and culling in a beef herd can only be accomplished where the breeder knows exactly what he is selecting for and has records indicating which animals are the best for these traits. The traits of economic value in beef cattle are fertility, rate of gain, mothering ability, efficiency of gain, carcass merit and longevity.

Breeding stock for use in commercial meat production can be selected from those ranking high in the population for the traits considered. Not all of the differences observed between individual animals will be passed on to their offspring. *Heritability* is the name given to the proportion of the differences measured between animals that is transmitted to the offspring. The higher the heritability of a trait, the more effective will be selection for that trait.

Heritability estimates for some performance traits are given below:

Trait Heritability	(%)
Calving interval	10
Birth weight	40
Weaning weight	30
Feedlot gain	45
Efficiency of gain	40
Final feedlot weight	60
Carcass traits: carcass grade	30
rib eye area	70
tenderness	60

Weaning weight, as an indication of mothering ability of the cow and growth ability of the calf, is an effective criterion for selection. Cows weaning heavy calves one year tend to wean heavy calves in succeeding years. The range encountered in weaning weights is shown by the following data for calves weighed on Record of Performance in Canada in 1969/70.

	205-day weight (lb)		
	Top 1/3	All calves	Bottom 1/3
Males	560	486	412
Females	511	445	379

The difference of 148 lb between the top and bottom thirds for male calves can be translated into at least $50 extra profit, using current feeder prices. This example illustrates the potential for improvement by selecting herd sires and heifer replacements from the top third of a herd and culling calves in the bottom third.

Post-weaning growth rate of the calves is measured during a feeding period of 160 days on the Record of Performance Program. The range in average daily gains made on this feeding period in Canada in the 1969/70 test is shown here for steers (in lb).

Top 1/3	All calves	Bottom 1/3
2.52	1.96	1.40

The difference of 1.12 lb per day between the top third and the bottom third can be translated into 180 lb of beef during the 160-day feeding period. This represents an additional income of $75 or more for the top-gaining animal.

Efficiency of gain and growth rate are closely related. Rate of gain is a good indication of economy of gain.

Carcass merit is very important to our beef industry. It is highly heritable and rapid improvement can be made through proper selection.

Longevity is important, but is not highly heritable. Producing replacements is costly and the average age of a herd should be near the peak production age of 6 or 7 years.

RECORD OF PERFORMANCE PROGRAMS

The Federal-Provincial Home Test Program is designed for home farm testing of purebred cattle. A program is also available in most provinces for commercial herds. The records obtained under the ROP program are used in culling poor-producing cows and selecting replacement bulls and heifers. Under this program calves are weighed at weaning and after a 168-day feeding period. Gains are indexed against those of other calves within the herd that were born within 90 days and managed alike. Records must be assessed in the light of management applied when comparing different herds.

The test stations compare rates of gain of bulls fed and managed the same during a 140-day test. The station test is designed for individual performance testing and progeny testing of beef bulls. Bulls are indexed for gaining ability following test completion.

Index is a word used to indicate how an animal rates compared with others of the same age, fed and managed the same. The index is expressed as a percentage. For example, an index of 100 means the animal is equal to the average of the group. An index of 115 means the animal is 15% better than the average of the group in which it was tested.

The main consideration in selecting cattle is how they rate in their management group, and this is what the index tells you. The important indexes are those for weaning weight, rate of gain and yearling weight.

The performance of each new herd sire used must be superior to that of the previous sire if real genetic improvement is to be made. Genetic improvement is slow, but permanent in nature and it tends to accumulate from year to year.

Records are absolutely essential if success is to be achieved in our beef breeding programs. Use of the Record of Performance programs available offers us the greatest avenue for improving rate of gain and feed efficiency.

MANAGEMENT OF CALVES

One of the main complaints of buyers of feeder cattle has been the large number of uncastrated males and calves that were not dehorned. Castration and dehorning are simple jobs when done at the right time, and they improve the value of the calves for sale as feeders or for feeding at home.

Dehorning should be done as soon as the horn button can be easily located – usually within 2 weeks to a month of birth. Many people prefer to use an electric dehorner at this stage but caustic can also be used. Care must be exercised to ensure a complete kill of the horn or unsightly crooked stubs will develop. Somewhat older calves can be dehorned using a scoop or gouge dehorner. This dehorner causes a more severe wound and requires more care to ensure a good job. Older cattle can be dehorned with a guillotine-type dehorner. The use of this instrument often causes some setback in cattle and the wound must be watched carefully to ensure that infection does not occur.

Dehorned cattle usually settle down and feed more quietly, especially when strange cattle are mixed. Buyers of market cattle like dehorned lots as their carcasses are less likely to have bruises.

(For further information on dehorning see Publication No. 1: *Dehorning,* available from N.S. Department of Agriculture, Truro, N.S.)

Most herdsmen prefer to *castrate* male calves when they are a few weeks old and this seems to cause the least setback to the calf. Others like to leave calves until they are several months old.

Two main methods are used – the Burdizzo (bloodless castrator pinchers) and the knife. The Burdizzo can be used anytime and does not leave an open wound, which may lead to infection or fly problems. Each cord should be squeezed separately rather than both at one time to avoid sloughing of the scrotum. Be sure that the entire testicle is below the jaws of the pinchers to ensure a complete job.

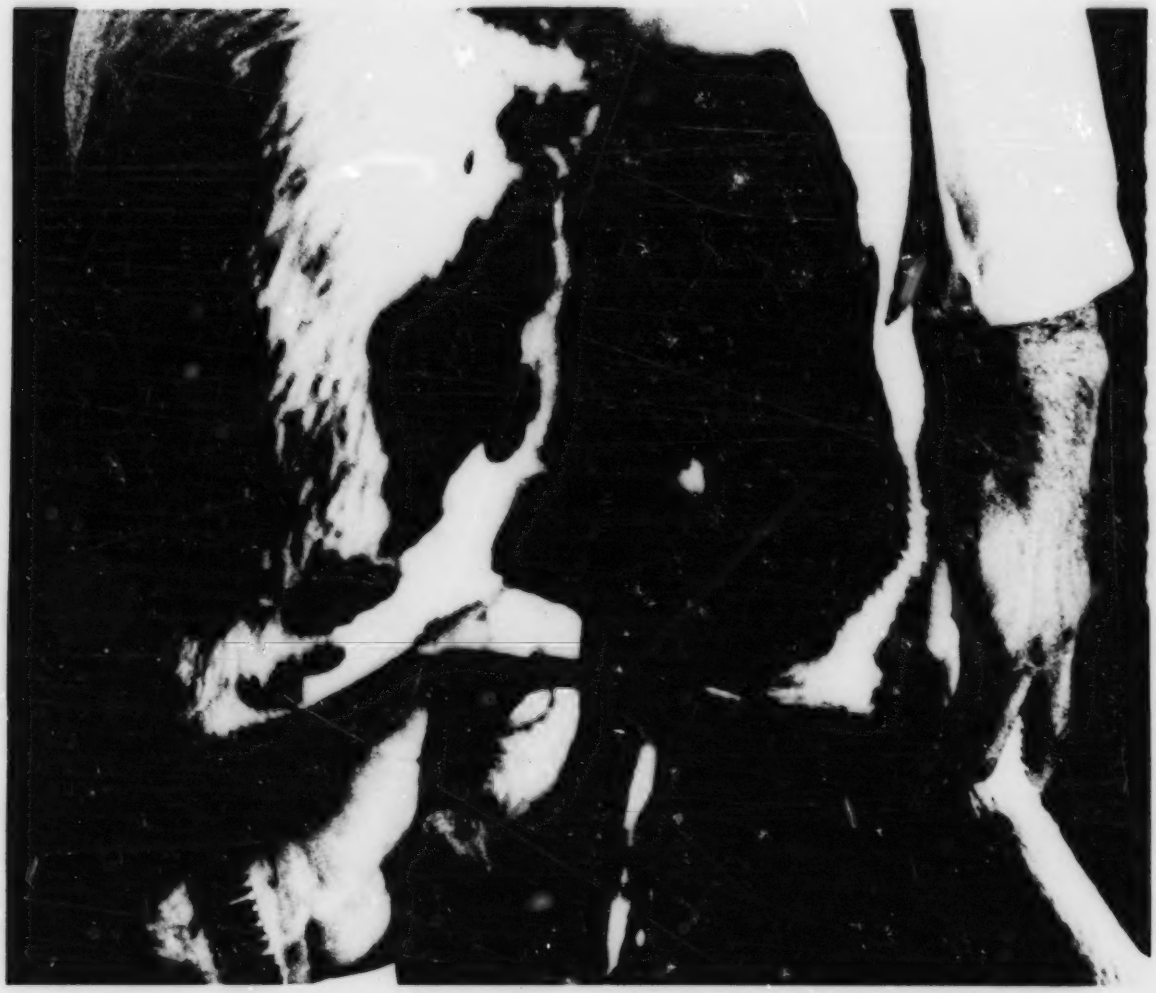


Figure 4. Testicle is squeezed down and cords positioned between jaws of the burdizzo towards outside edge of scrotum.

When the knife is used, a complete job is assured. However, it should only be used during cool weather, when flies are not a problem, and care must be taken to prevent infection.

In many areas *preconditioned* calves are receiving bonus prices. Preconditioning means different things to different people but it usually includes at least the following: calves are weaned and accustomed to eating dry feed, free from internal (worms) and external (lice) parasites, vaccinated against blackleg, enterotoxemia, shipping fever and possibly IBR. Such calves are prepared for the stress of shipping and are ready to settle down and go to work in a feedlot. Cattle to be fed out at home will also benefit from being preconditioned before starting on heavy feeding.

Creep-feeding means the provision of extra feed, such as grain, for the calves in an enclosure that they can enter but the cows cannot. Whether or not it pays to creep-feed calves depends on several factors, such as time of calving, milk production of the dam, quality of pasture or forage available, and what you propose to do with the calves at weaning. Often, it pays to creep-feed fall- or winter-born calves during the barn feeding period, but not during spring and early summer when cows are milking well and there is ample high-quality pasture for both calves and cows. If provided with both,

Figure 5. When using the burdizzo for castration, care is required not to pinch all the way across scrotum.

calves will eat the grain but reduce their intake of the cheaper source of nutrient – the pasture – and not gain much faster. However, when pasture herbage becomes scarce or low in quality in late summer, creep-feeding often pays by increasing the weight gained by the calves. Some feeders pay a premium for large, creep-fed calves as they go on feed quickly when placed in the feedlot, but others will discount such calves; you should know your market before deciding to creep-feed. The ration offered in the creep-feed does not need to be complex. Whole oats or rolled barley alone or in combination are satisfactory, although calves usually learn to eat more quickly and eat more if linseed or soybean meal or molasses is added to improve palatability.

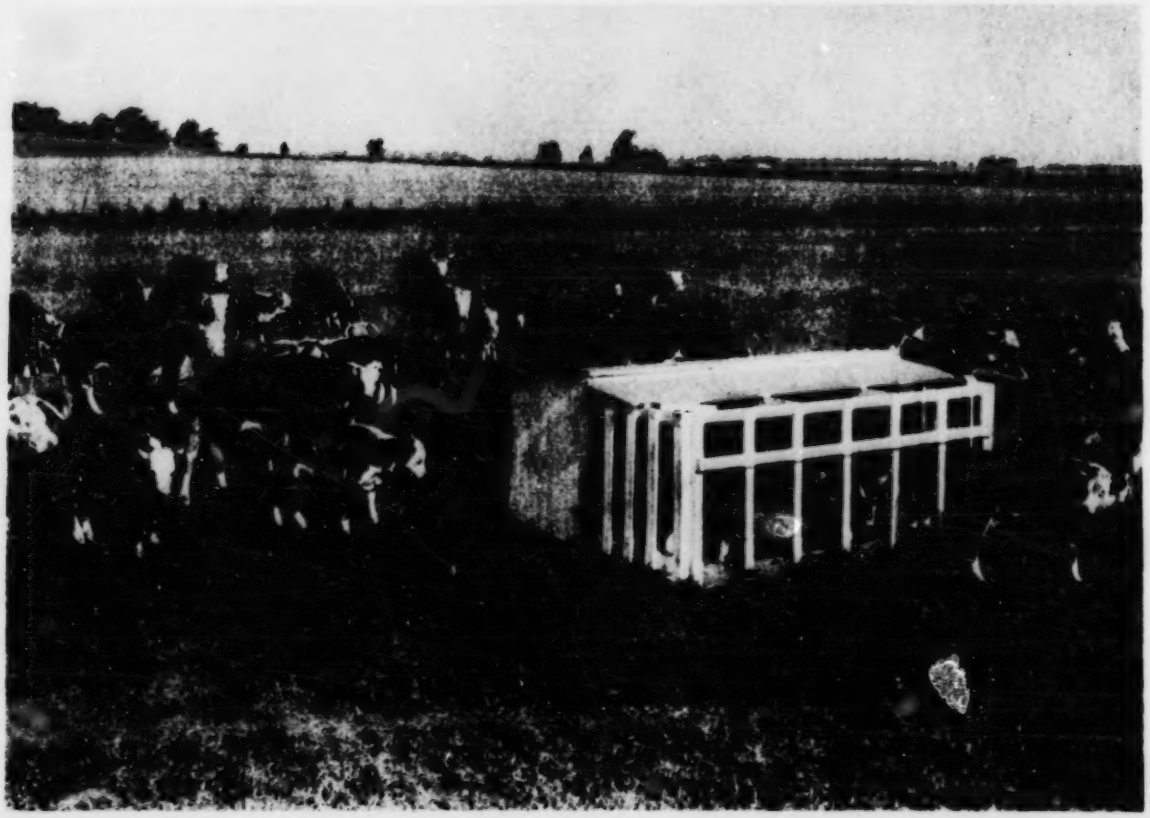


Figure 6. Creep-feeding calves will pay when pastures are in short supply. (Photo Courtesy of American Cyanamid Company).

FEEDLOT PROGRAMS

Feedlot operators have several sources of cattle available to them. Usually cattle are purchased through feeder sales, regular auction sales or by private arrangement. Many cow-calf operators in Eastern Canada feed their own calves to market weight.

Before buying cattle, each farmer must decide what kind of cattle he is going to feed. The type of cattle available may influence this decision, but feed supply, finishing program and experience are more important considerations.

Fall feeder sales generally offer the best selection of good beef calves and yearlings. Cattle can be purchased in lots that are uniform in breeding, quality and weight.

A large number of feeders are bought privately. These are usually plainer cattle and may include dairy and dairy-beef animals. Regular livestock sales are held in many centers. At these sales a large number of dairy and dairy-beef-cross calves are sold. Many of these calves change hands several times before being marketed as finished beef.

STARTING CATTLE ON FEED

The first 3 weeks after cattle arrive are critical in a feedlot program. Find out as much as possible about the condition of the cattle and the treatments received before they were shipped. This helps in deciding what additional treatment is necessary and what initial feed to offer. Keep the cattle isolated if possible during the first 3 weeks, and have adequate feed and watering facilities to quickly restore rumen fill and liquids lost during shipping. Also, keep stress to a minimum.

Calves should be fed hay for the first 10 days and gradually started on the ration to be fed. Yearlings can be started on corn silage and grains fairly quickly, but calves should be accustomed slowly to ration changes.

If high levels of grain are to be fed, the adjustment period is much more critical. The grain ration should be gradually increased and roughage decreased over a 3 to 4 week period.

Cattle should be allowed to rest for the first 24 hours. It is better for cattle to regain fill before any necessary husbandry treatments such as castration, dehorning, worming, or vaccination are performed. However, they should be checked frequently for signs of sickness and treatment administered promptly when needed.

SYSTEMS FOR FINISHING CATTLE

The winter feeding program for finishing cattle depends on the age and type of cattle being fed. Generally, most economical gains are obtained in the Atlantic Provinces by using rations high in homegrown roughages, unless by-products are available. This means that often cattle are not fed for high rates of gain and are marketed at slightly older ages than in areas where grain is cheaper. For example, in a trial conducted at the Nappan, N.S., Experimental Farm a number of years ago, the feed costs for steer calves fed a high energy ration from weaning to market were 22¢ per lb of gain, but only 14.3¢ for calves fed to gain 0.75 lb per day during the winter and finished on pasture the next summer.

The feeding system worked out at the Nappan Farm and the Fredericton Research Station, for winter- or spring-born beef calves weaned in the fall, involves the feeding of only about 1,000 lb of grain to produce an A-1 or A-2 brand carcass at 18-24 months of age. The first winter, the calves are fed all the high quality forage they will eat and 3 to 4 lb of rolled grain plus minerals and vitamins. They gain 1.5-2 lb per day, depending on the quality of the forage. They are turned to pasture the following summer and some are ready for slaughter by the end of the summer at about 18 months of age. The remainder are put back on high quality silage and 2 lb of rolled barley per day. They gain 2 lb per day on this program and are slaughtered when they reach the desired weight. Under this program feed costs per pound of gain during the barn feeding periods are low. Hormones are used to improve performance during the final 150 days before slaughter.

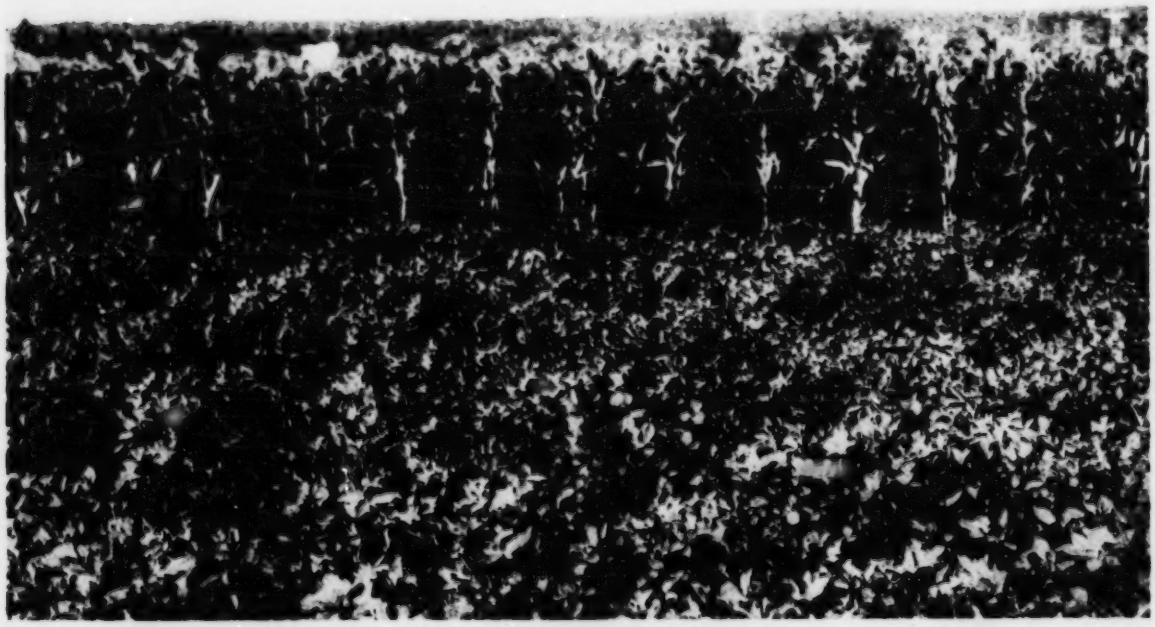


Figure 7. Alfalfa and corn complement each other in nutritive value.

Feeder cattle may be purchased as calves, yearlings, or 2-year-olds. Buying *calves* is considered a good way to reduce your risks. Since they are bought at light weights, usually 400-500 lb, they are more efficient in feed conversion than yearlings or 2-year-olds, and a higher proportion of the final product is produced in the feedlot rather than being purchased. The initial purchase price is usually lower than for heavier animals even though the price per pound may be higher.

The main disadvantage to feeding calves is their slow turnover; the capital invested in the stock is tied up for a longer time.

Yearlings are preferred by many feedlot operators. They usually weigh in the range of 500-750 lb and their feed conversion is good, although not as high as for calves. Because fewer pounds of beef are put on in the feedlot with yearlings, the purchase price per pound must be closer to the selling price than for calves, when a negative margin can often be absorbed. Healthy yearlings in low condition due to inadequate feeding will make highly efficient gains when provided with adequate feed. This type of feeder is in demand each spring for placing on pastures.

Dairy and dairy-crossbred steers are often available. These steers gain weight more rapidly than many purebred beef steers and with equal or better feed efficiency. They do not usually dress out as well as beef steers or reach as high a carcass grade, so that the selling price per pound is less. The difference in selling price must be reflected in the buying price, if you hope to make a profit on feeding dairy steers. To be marketed at 900-1100 lb, Holstein steers must be fed high-energy rations from weaning. If they are fed high-roughage rations, they do not usually carry enough finish to bring good prices until they reach 1400-1500 lb liveweight. Many markets do not want steers this large. Before deciding to feed dairy-type steers, look into the available markets and determine the size and degree of finish that is likely to give you optimum returns, considering feed costs.

Heifers do not gain quite as fast as steers and require more feed per pound of gain if fed to the same weight as steers. Heifers coming into heat cause stress – and sometimes injury and reduced gains – in group-fed cattle, especially if steers and heifers are mixed in the group. The feed additive MGA will prevent heifers from showing heat and is recommended for use if large numbers of heifers are being fed. Heifers should be sold at liveweights of 100-150 lb less than comparable steers to yield carcasses of equal finish. If they are fed to greater weights, feed efficiency falls as they tend to lay on excess fat. Many experiments have shown that heifers and steers of equal finish or fat content have equal dressing percentage and the carcasses have equal retail value per pound. Buyers usually pay less for heifers than for steers because some are overfat and some are pregnant. If you are sure your heifers do not have these faults, consider selling them according to rail grade and carcass weight.

Cows and older steers are sometimes purchased to use extra pasture or homegrown feed. Healthy but thin animals make rapid gains on adequate feed and return a reasonable profit, especially if the grade is improved. The problem with buying such animals is one of distinguishing between the thin, healthy animals and those suffering from disease or internal parasites.

PREPARING CATTLE FOR MARKET

In deciding on the type of cattle to feed, producers must consider the market available. Cattle must be fed to produce a desirable carcass and then marketed to take advantage of current prices and trends.

Many markets are available to producers in Eastern Canada, for example, through auction sales, drovers, packing plants, local butchers and directly to consumers. Factors to consider in deciding on a market are market price, transportation cost, selling cost, shrinkage, services, and weighing conditions.

Selling by rail grade at a negotiated price is one way of insuring that you receive full market value for your cattle. The grade is established by officers of the Canada Department of Agriculture. In the future, no doubt, standard procedures will be established for dressing and weighing cattle on a rail-grade basis.

Regardless of the market chosen, animals should be shipped in as attractive condition as possible. Uniform groups are more attractive to buyers. Cattle should be handled gently to avoid bruising and injury.

Shrinkage refers to the loss in weight between feedlot and market scales. Cattle lose weight largely because of excretions and to a lesser degree from tissue moisture loss. The longer the trip the greater the shrinkage. The greatest loss is in the first few miles or first 2 or 3 hours of shipment and can be 4 or 5% of body weight. Cattle should not be held more than 24 hours without feed and water.

Several factors influence dressing percentage in cattle, including the amount of fill, type of animal, degree of finish and sex. Dressing percentage refers to the ratio of carcass weight to liveweight. It varies depending on weights used to calculate it, that is, warm or cold carcass weight, initial weight at the feedlot or shrunk weight at the plant. Based on warm carcass and shrunk liveweight, dressing percentage varies from 50% for thin cattle to 60% or more for fat cattle.

FEEDING

For general information on feeding beef cattle and for information on common feeds, refer to Publication No. 400.50, Feeding Guide for the Atlantic Provinces, *available from Agricultural Department Officers.*

To make the most efficient use of the available feeds, samples of the roughages, homegrown grains and by-product feeds should be tested at your provincial feed testing laboratory. Contact your agricultural representative or provincial department of agriculture headquarters for information on how to take the samples and submit them for analysis. Mechanical samplers may be borrowed from most agricultural offices. It is important that the sample be representative of the feed available, if the tests are to be useful.

Many beef operations are maintained to use waste or by-product feeds available on the farm or in the area. Brief descriptions and suggestions on the use of some of these common feeds follow:

STRAW

Straw that has been stored without too much weather damage and is free from mold can be used for feeding dry, pregnant beef cows. A daily ration of 12 lb of straw, 4 lb of rolled barley or other grain, and 0.5 lb of a

Figure 8. Cull potatoes are an excellent energy feed for cattle. (Photo Courtesy of Agricultural Press Ltd.)

50% protein supplement containing vitamins A & D and minerals will maintain a cow through the winter. If some hay is fed, the amount of grain can be reduced. Straw should not be fed in large amounts to young stock or fattening cattle, as it is too low in digestible energy. It is also deficient in vitamins and protein and these must be supplied in other parts of the ration. The straw from grain fields that were seeded out often contains some clover and grasses, which improve the nutritive value. If such straw is fed in excess of appetite, the cattle will sort out the best part and the remainder can be used for bedding. Grinding straw through a hammer mill will result in higher daily intake and is recommended if the equipment exists on the farm.

POTATOES

Cull potatoes and potato processing plant wastes are available in some areas in large quantities. They are an excellent energy source for cattle and are highly palatable once cattle are induced to start eating them. Many animals will consume over 100 lb per day of fresh material. Potatoes are deficient in digestible protein, calcium, magnesium and some vitamins. Young cattle can be readily fattened on high levels of potatoes. They should be fed at least 2 lb per day of roughage (hay or straw) and 1 lb per day of a commercial feedlot supplement containing 50% crude protein plus minerals, vitamins and other additives. If potatoes make up the remainder of the ration, additional protein will be needed and can be supplied by 0.5 to 0.75 lb of soybean meal or similar plant-protein supplement. A mineral mixture of equal parts of dolomitic limestone, dicalcium phosphate and trace mineral salt should be provided in a box. Cattle must not be fed high levels of sunburned (green) potatoes or potato sprouts as these contain a toxic material which can poison the animals. It is not necessary to cook potatoes for cattle. Some people prefer to pulp potatoes before feeding to prevent choking but many feed whole potatoes and report very little trouble unless the potatoes become frozen. As with any high energy feed, it is important that the amount of potatoes fed per day be increased gradually to prevent digestive upset.

APPLE POMACE

Apple pomace, a highly palatable by-product from the production of apple juice, contains mainly the peel, core, and seeds of apples. Dried pomace is similar to lightweight oats in food value, except that it is lower in digestible protein (less than 2%). In some areas, spray residues contaminate the pomace and it is necessary to restrict the amount fed, or to feed it for only short periods of time, to prevent pesticide residues appearing in the carcass. Check with your supplier before feeding pomace.

PROCESSING WASTE

Processing waste from the canning and freezing of other vegetables and fruit is often available in quantity at the plants. This material can be ensiled and fed to cattle during the winter. The composition and feeding value of the material varies with the crop and the part of the plant being discarded. If possible, obtain a sample for testing at your provincial feed testing lab before planning your feeding program. Check with the supplier regarding possible pesticide residues before feeding processing waste.

WET BREWERS' AND DISTILLERS' GRAINS

Wet brewers' and distillers' grains vary in value depending on the grain used in the process and the amount of water in the slurry. In general, these grains are higher in protein (27-28%) and lower in energy than the original grain. The cost of hauling the wet material usually limits the area in which these grains can be fed. They can be fed in any amount to beef cattle and will usually supply all the supplementary protein needed in the ration.

FEED ADDITIVES

Diethylstilbestrol (DES) has been the most widely used feed additive over the past 20 years. However, its use for fattening cattle was suspended in Canada on January 1, 1973, pending further information on possible harmful effects from trace amounts of DES found in livers of some animals.

Implants of natural hormones are available for use in Canada under the trade name Synovex S and Synovex H. Synovex S is designed for use with steers and contains the hormones progesterone and estradial benzoate. Synovex H is for use in heifers and contains testasterone propionate and estradial benzoate. Neither type of implant is to be used within 60 days of slaughter.

Synovex implants increase the rate of gain of fattening cattle by 10-15% and improve feed efficiency by 8-15%. The manufacturer's recommendations must be followed to ensure maximum benefit from implanting. Although Synovex implants are more expensive than the synthetic hormone preparation, DES, formerly available, their use still results in a good profit to the feeder.

Full response to hormone preparations can only be expected in healthy, parasite-free cattle that are fed a

balanced ration in adequate amounts.

Implants of zeranol have been approved for use in beef calves and feedlot steers and heifers. These implants also improve the rate and efficiency of gain. They are not to be implanted within 65 days of slaughter.

MGA (melengestrol acetate) prevents heifers from coming into heat when it is fed at the approved rate of 0.4 mg per head per day. It gives about the same improvement in rates of gain and feed efficiency as feeding DES to heifers (8-15%) and costs about 1¢ per animal per day. It does not improve the rates of gain of steers or spayed heifers and must not be fed with other hormones. Feeding MGA must be discontinued 48 hours before slaughter; and it should not be discontinued much before 48 hours, or the heifers will start coming into heat and much of the advantage of using MGA will be lost.

Antibiotics fed at low levels (about 60 mg per day) to fattening cattle improve rates of gain and feed efficiency under some conditions. The response to low-level antibiotic feeding is not consistent and can only be recommended with certainty where chronic disease conditions are likely to exist.

A higher level of a mixture of chlortetracycline and sulfamethazine (Aureo ® S700) has been approved for feeding to cattle for the first 4 weeks after entering a feedlot. It is designed to help maintain weight gains and feed efficiency in cattle during periods of stress due to weaning, shipping or handling. Cattle cannot be slaughtered for food for at least 21 days after the last treatment with this preparation. Extensive research indicates that the use of this product is advisable for cattle shipped a considerable distance or going through a sale barn before arriving at a feedlot.

PASTURE FOR BEEF CATTLE

Pasture can provide the most economical source of feed for beef cattle and should be considered as a major source of nutrients for beef production in this region. Proper fertilization and grazing management techniques can increase the productivity of many of our pastures several fold.

PASTURE FOR BEEF COWS

For a breeding herd, pasture should be the main source of nutrients. Winter feeding programs now emphasize a restricted level of feeding for spring-calving brood cows, just enough to ensure healthy calves and to maintain reproductive efficiency. This minimizes the requirements for winter feeding of costly stored forages, but makes it

Figure 9. Pasture can provide the most economical source of feed for beef cattle.

essential that ample pasture is available during the grazing season, so that cows can recover winter weight losses and attain a gaining condition during the breeding season. Ample early pasture also stimulates milk flow to support growth of nursing calves.

Pasture area required per cow depends on type of pasture sward, fertility and grazing management. With good pasture one cow with calf requires about 3/4 acre of pasture but this increases under less-favorable conditions.

Shade as well as an ample supply of clean water should be available in pasture areas. A mineral mixture supplying salt, calcium, phosphorus, cobalt and iodine should be available to grazing animals at all times, especially before and during the breeding season.

Pasture can provide ample feed to support good growth in replacement heifers. The heifers should be on good pasture and in a gaining condition during the breeding season. Minerals plus a supply of clean water and shade should be available, as for breeding cows.

FATTENING MARKET ANIMALS ON PASTURE

Beef animals on pasture may not attain the degree of finish and grade that feedlot cattle will, but the lower feed costs will offset the lower prices obtained. The gains obtained on pasture vary considerably depending on the type of pasture, fertility, and grazing management. Grain feeding on pasture will improve the quality and yield of beef and will increase the carrying capacity of the pasture.

Several systems of pasture grazing may be followed:

Pasture only – This system, with no grain feeding, will not produce well-finished beef but under good fertility and grazing management should produce up to 2 pounds of gain per day throughout the pasture season. Older animals in poor condition will give the greatest response in actual gains and improvement in condition on pasture. Partly finished animals on pasture only may tend to lose condition and should receive some grain.

Pasture with limited grain during the latter part of the grazing season – Grazing animals may put on half or more of the season's gain during the first 2 months of grazing. This is because many pastures tend to drop in productivity during the hot, dryer midsummer. Feeding a limited amount of grain from midsummer to the end of the grazing season maintains growth rates, produces more and better beef, and increases the carrying capacity of the pastures. Grain feeding rates vary, but up to 0.75% of body weight may be fed per day, depending on pasture condition and type of animals being fed.

Pasture plus high level grain feeding throughout the pasture season – This system is used most often with animals that are partly fattened at the start of the pasture season. It ensures that cattle will be ready for market at an early date. Cattle taken off pasture under this system will adapt to grain feeding and will gain rapidly in the feedlot if additional finishing is required.

Minerals and salt should be available free choice for market animals on pasture. A suitable mineral mixture for pastured animals is two parts of dicalcium phosphate plus one part trace-mineral salt. This mixture should be placed in covered feed boxes adjacent to the water supply.

Zero grazing refers to the practice of cutting fresh grass and hauling it to the cattle daily. It increases the carrying capacity of a pasture and is most often used where land costs are high and the farm is equipped with feedlot facilities. A variation of zero grazing is to store all forage as silage and feed cattle yearround in the feedlot rather than turn them out to pasture.

PASTURE MANAGEMENT

To produce good weight gains on pasture and maintain productivity throughout the pasture season, adequate amounts of fertilizer, plus good pasture-grazing management are required. In addition, pastures seeded out to forages adapted to pasture grazing are usually more productive than permanent pastures, especially under drier midsummer conditions. (See federal and provincial field crop recommendation bulletins for pasture establishment and fertilization recommendations.)

Pasture management involves rotational or other forms of grazing management that allow a recovery period following each grazing cycle. Four to 6 inches of herbage on pastures will provide excellent quality forage. Early in the season some herbage may have to be removed as hay or silage to cope with the rapid spring growth and to maintain palatability.

Many permanent or old pasture swards have a predominately white clover-blue-grass sward. With adequate moisture this sward can be very productive, but under

dry, midsummer conditions it becomes dormant and quite unproductive. There are available now a number of forage varieties developed especially for pasture which are more productive under these conditions.

SUPPLEMENTARY PASTURE

Annual crops for supplementary pasture can be important in a pasture program for beef. These crops are planted to provide additional pasture during mid- to late-season when regular pastures drop off in productivity. Among the crops used for supplementary pasture are oats, millet, rape, kale and winter rye. These crops, either grazed or used for green chop, enable a beef producer to maintain growth in market animals throughout the entire grazing season or to extend the grazing season.

DISEASE CONTROL IN BEEF CATTLE

INFERTILITY

Heavy financial loss may result from failure of cows to reproduce regularly. Causes of infertility include:

- Infectious diseases, such as leptospirosis, vibriosis and infectious pustular vulvovaginitis.
- Breeding cows too soon after calving.
- Poor quality semen.

Control is based on:

- Purchase of additions to the herd from other herds not experiencing infertility problems.
- Regular veterinary examinations of cows about 1 month after calving and about 2 months after breeding.
- Fertility check on herd sires, if previous fertility record is unknown or questionable.
- Vaccination against infectious diseases, as prescribed by your veterinarian.

ABORTION

The most suitable materials for laboratory tests to determine cause of abortion are the aborted fetus and a piece of the afterbirth. If it is not possible to take these to the lab the same day, they should be kept in a cool place where dogs, cats, rodents and birds can't get at them.

A cow that aborts should be isolated from the remainder of the herd. The place where she aborted should be cleaned and disinfected, with disposal of the soiled bedding by burning.

CALVING PROBLEMS

First calf heifers, and sometimes older cows, may require assistance at calving time. It is usually wise, however, to let labor progress 1 to 2 hours, to allow for maximum

Figure 10. Cereal grains make an excellent supplementary pasture for mid-summer grazing.

opening of the birth canal. (Some heifers may show uneasiness and slight labor for a day before really 'getting down to business.')

The calf's nose and front feet should appear at about the same time. If this does not seem to be happening, and if assistance appears to be needed, the cow's hindquarters and the operator's arms should be washed with a mild antiseptic solution. If you can't properly position the calf for delivery, get veterinary help.

The navel of a newborn calf should be disinfected with 2% tincture of iodine or with 'pinkeye and wound spray' to help prevent joint-ill. Also, it is important that the calf soon gets its mother's milk, which contains antibodies against infection.

CALF SCOURS

Calves born on pasture, or in a clean, dry barn are not often affected with scours. Most often affected are calves born in wet, dirty barns from cows on a winter ration low in vitamin A. In badly infected barns there may be a high death rate in newborn calves.

Pregnant cows may be fed vitamins A,D and E in their ration, or they may be given these vitamins by syringe and needle during the last 3 months of pregnancy.

Treatment of newborn calves as outlined under Calving Problems will help to prevent the development of scours. Also, the barn calving area should be clean, dry and reasonably free of draughts.

Where sanitation and management fail to prevent outbreaks of scours, early treatment under veterinary supervision is important. Indiscriminate use of antibiotics should be avoided.

WHITE MUSCLE DISEASE

Inability to stand and get around properly, distress in breathing and sudden death due to heart failure are common signs of white muscle disease. Cause of the condition is deterioration of the skeletal and heart muscles from deficiencies of vitamin E and the mineral selenium.

Pregnant cows may be treated as outlined under control of Calf Scours.

Young calves may be given vitamin E and selenium by syringe and needle on the second or third day following birth. On farms where white muscle disease is a serious problem, the injection may be repeated a week later and again when turning the calves to pasture.

PINKEYE

Early symptoms of pinkeye include swelling and redness of the eyes and a moderate to heavy discharge of tears and pus. Later a white film may cover the surface of the eye. The disease is most common in early summer.

Affected animals should be isolated from the remainder of the herd, preferably in a shaded place and away from flies.

Many ointments, powders and sprays are available for treatment of pinkeye. Sprays are probably most popular. As these are under considerable pressure, the can of spray should not be held closer to the eye than about 6 inches to avoid further damage to the diseased eye.

BLACKLEG

A dead, bloated carcass found in the pasture is often the first indication of blackleg in a herd. Cattle between 4 and 30 months are more susceptible than others to the germ of blackleg, which may live for many years in soil.

Vaccination with *Clostridium chauvei-septicus-perfringens* bacterin is highly effective in preventing blackleg and related disease. For maximum protection, the vaccination should be done at least 10 days before turning the herd to pasture in the spring.

LAMENESS

Long toes on cows and bulls cause undue strain on the tendons at the back of the legs. This, and the tendency of long toes to crack, often produces lameness, which interferes with grazing and with breeding.

Swelling between the toes and above the hoofs, which later breaks and discharges foul smelling pus, is appropriately called foot rot. The germ of foot rot thrives in swamps and muck. Cuts and bruises make the feet vulnerable to infection.

Control is based on:

- Routine hoof trimming in late winter or early spring – a set of slings makes this job easier.
- Draining or fencing off swamps.
- Keeping pastures, lanes and yards clean and free of stones, wire, broken glass and other refuse.
- Including organic iodine in the salt-mineral mixture.

EXTERNAL PARASITES

Horn flies and *face flies* annoy cattle at pasture and thus interfere with weight gains. Face flies help to spread pinkeye. Control of these pests at pasture is made easier by the use of rubbing devices that automatically apply insecticide to the cattle when they put their heads into the salt-mineral box or when they rub against the devices.

Warble flies cause economic loss because they make the cattle lose weight galloping over the pasture during the fly season, and the warble grubs damage carcasses and hides in the spring. Ruelene or neguvon poured on the backs of cattle in the fall of the year provide very effective control. These products are poisonous and product label directions should be carefully followed.

The fall treatment for warble fly may be repeated later in the winter for control of *lice*. Cattle that are not treated in the fall should *not* be given this treatment for lice after December 1. Instead, derris powder may be used.

INTERNAL PARASITES

Coccidiosis may be suspected when calves are affected with severe scouring and straining. Frequently clots of blood are passed. This disease is more common when calves are closely confined in wet, overcrowded pens or when they drink from mud puddles. Microscopic examination of feces from affected calves shows the egg-shaped parasites.

Control is based on:

- Isolation and treatment of affected calves with sulfa drugs; blood transfusion if necessary.
- Clean, dry pen.
- Avoidance of overcrowding.

Stomach and intestinal worms may be suspected when cattle, especially grazing calves and yearlings, scour and become unthrifty, thin and weak. The worms spend part of their life cycle on the ground and cattle become infected while grazing. The climate of the Atlantic Provinces is moist and cool, conditions these parasites like. Pastures may become heavily contaminated in a period of 2 or 3 weeks with any of a dozen or so species of parasite eggs and larvae.

Lungworms resemble short white threads. Their life cycle is somewhat similar to that of stomach and intestinal worms. Adult lungworms live in the air passages of the lungs of cattle. Affected cattle become unthrifty and cough a great deal. In heavy infection the animal may suffocate because lung air passages are plugged with worms.

Control of stomach and intestinal worms and lungworms is based on:

- Prepasture treatment of cattle with phenothiazine, mintic, thiabendazole, dictycide, tramisol or other drug prescribed by a veterinarian to remove the species of parasites present in the herd.

- Treatments at other times of the year, if necessary, and as prescribed for the particular parasite problem.

- Drainage of pastures and yards (worm parasites need moisture to survive and infect cattle).

- Regular removal of manure from feedlots; and spreading of manure on cropland, not on pastureland.

URINARY CALCULI (BLADDER STONES)

Unsuccessful efforts of a steer to urinate, kicking at its belly, stiffness in moving about and switching its tail are the usual signs of urinary calculi. In extreme cases the bladder may rupture, with the steer dying in a coma 2 or 3 days later.

A veterinarian should be called for surgical relief of the urinary obstruction before the bladder ruptures. Prevention consists of providing adequate vitamin A and, in some cases, carefully increasing the salt content of the ration to encourage greater water consumption.

WARTS

The unsightly appearance of warts around the head, neck and back of young cattle may interfere with their sale. Usually warts disappear by the time heifers have their frist calves.

Commercial wart vaccines are available, but vaccines prepared from wart tissues of affected animals will probably give better results in the herd.

Vaccination does not give 100% immunity to warts. Other control measures include removing sharp objects (nails, etc.) from walls, feed racks and gates. Also, tattooing equipment and other instruments should be kept clean and disinfected to avoid spreading wart infection through the herd.

RINGWORM

A variety of fungicides are available for treating ringworm on cattle. These include tincture of iodine, tinevet, captan and others. Used crankcase oil has been claimed to be effective, but cattle may get lead poisoning if they lick or chew rubbing devices soaked with this oil. Since ringworm is caused by different species of fungi it is often necessary to try more than one remedy to obtain a cure.

Barns should be thoroughly cleaned and disinfected in the spring to remove spores of ringworm fungus along with other disease germs.

VIRUS DIARRHEA

Loss of appetite, fever for 2 or 3 days followed by scouring, and the appearance of crusty lesions on the muzzle are the usual signs of virus diarrhea. Cattle 6 to 24 months old are more susceptible. Occasionally a cow may abort. Lameness may develop in a few cases.

Vaccines are available and, ideally, vaccination should be done 3 weeks before cattle are put in a feedlot.

Diagnosis of this condition by your veterinarian is essential, as it can be confused with about 14 other diseases. Diseased animals may be treated to prevent or reduce secondary bacterial infection.

SHIPPING FEVER

The term "shipping fever" has been used for many years to denote respiratory disease in cattle and other animals during or following shipping and other conditions of stress.

Dullness, loss of appetite, fever, discharges from the eyes and nose, and coughing are prominent signs.

Sulfa drugs and antibiotics are the usual drugs employed in treatment. These are often added to the herd's drinking water for ease of treating many animals.

New additions to the herd should be kept in isolation for 2 weeks. Cattle that come down with shipping fever should be further isolated. Cool barns (50-55°F) are less likely to stress cattle or predispose them to shipping fever.

INFECTIOUS BOVINE RHINOTRACHEITIS (I.B.R.)

Close contact makes this respiratory disease more severe in feedlot cattle than in others.

The symptoms of I.B.R. are somewhat similar to those of shipping fever. In addition, fat animals lose weight rapidly and, in a few cattle, the nose becomes red and crusted (the disease is sometimes called rednose).

Abortion is fairly common some weeks after an outbreak of disease in the herd, or after vaccination. Cows 6 to 8 months pregnant usually abort and often retain the afterbirth.

The ideal program of prevention would be *preconditioning* – vaccinating cattle against I.B.R., shipping fever, virus diarrhea, etc., 3 weeks before they are shipped to feedlots. Also well in advance of being introduced to strange, crowded quarters the cattle should receive other necessary treatments such as castration, dehorning or implanting.

Because of the risk of causing abortions, I.B.R. vaccination should only be employed in areas or situations where this disease has appeared or is thought very likely to occur.

DIGESTIVE PROBLEMS

Prevention and control of digestive problems, such as indigestion, bloat, choke and hardware disease, involves several do's and don'ts of herd management:

- Avoid sudden changes in feed.

- Avoid overfeeding with starchy feeds, which ferment easily.

- Give a full feed of dry roughage to which the cattle are accustomed before putting them on lush pasture.

- Do not attempt passing rubber hose, fork handle, or other such objects down the throat of a bloated or choking animal. Consult your veterinarian.

- If cattle are accidentally overfed, withhold drinking water, move the affected cattle about frequently and call your veterinarian. He will be able to select animals for treatment and assist you in selecting animals for emergency slaughter.

- The administration by mouth of specially designed magnets gives effective prevention of hardware disease in cattle. Also, pieces of wire, nails and other metal should be kept out of the feed.

BEEF CATTLE HOUSING

Beef cattle production, whether it involves feeder or cow-calf operation, requires careful planning. Planning of housing, equipment, and feed stores is essential for the efficient use of labor and equipment to ensure a successful enterprise.

Temperature extremes are not serious hazards to a beef operation in Atlantic Canada. However, the provision of adequate protection for the animals from wind, rain and snow, with additional protection for young calves, is essential for a successful operation. Muddy conditions in uncovered areas such as feedlots should be prevented.

Adequate shelter for the least possible investment per cow is essential. For example, consider converting unused buildings to loose housing or building inexpensive pole frame structures. Well-drained woodlot sites provide adequate shelter in many areas. Early steps in planning require decisions on the number and kind of animals and the approximate feeding program to be followed. It will be necessary to calculate the space needed, including feed storage and processing, and to sketch possible layouts. Plan the manure-handling system, as well as traffic routes for animals, cleaning equipment and supply vehicles. Try to pick a site that will allow future expansion.

Some of the more common housing systems are outlined here. Additional suggestions and detailed building plans are available from the Canadian Farm Building Plan Service.

COW-CALF FACILITIES

Open-front building with bedded resting area and paved feeding area – The cattle are confined in yards, with a covered shelter to provide protection from wind and precipitation. This shelter usually has an open front facing south. The land must slope away from the front so that water runs off.

Provision must be made for: draft-free maternity pens for use in severe weather; areas for calf creep feeding; separate areas for feeding and resting; frost-free water; and cattle handling and treatment facilities.

Figure 11. Existing buildings can often be adapted for beef cattle with little cash outlay.

Figure 12. A hard-surfaced alley is essential along feed bunks.

A well-compacted, graded gravel floor is required in the bedded area. Enough sawdust, shavings or chopped straw must be available to maintain a good bed.

The feeding area must be provided with adequate manure storage adjacent to but outside the yard. Paving of the entire yard is desirable, and is essential unless a minimum of 400 sq ft of yard and 30 sq ft of bedded area is available per cow. Feeding bunk space required per animal is 8 in. for animals being fed free choice and 24 in. for animals whose feed intake is restricted.

Sheltered woodlot with shelter for young calves and for cows during calving time – The cattle are located on a site with ample dry, well-drained resting, feeding and exercise areas well protected from the wind, snow and rain by a dense softwood growth.

The site should be adjacent to fields or open areas with a southern exposure and protected from the prevailing wind, as cattle will prefer to remain in these areas on sunny days. A 12-ft-wide paved area along the face of all feed bunks is required so that a clean area may be maintained by periodic scraping.

A well-bedded, covered shelter is required for the calves, especially during the early spring when weather changes may be sudden and severe and ground conditions are often wet.

FEEDER CATTLE FACILITIES

Open feedlots with covered bedded area – The cattle are confined in lots with covered shelter, which may be an open-front building to provide protection. The building must be located where adequate grade can be provided to carry water away, and the open front must face south.

The feeding area may be a covered fence-line feed bunk designed for feeding chopped material by self-unloading

Figure 13. Beef cows can be overwintered with only a softwood grove for shelter in many areas of Eastern Canada.

forage wagon; or a covered feed bunk equipped with a conveyor allowing animals to feed from both sides.

A windbreak fence must be provided with wind pockets located at each end of the building to control wind and drifting snow. A paved yard is essential, for scraping and piling manure. Space requirements are 20 to 25 sq ft of bedded area and 8 in. of feeding space per animal, if they are to have feed available at all times.

Modified environment – Cattle are confined within a building in which the natural ventilation is usually sufficient to maintain a constant winter outside-to-inside temperature difference instead of a constant inside temperature.

A feeding area of 12 ft minimum width is required along the feeders. For satisfactory manure-pack operation a fence is required to separate feeding and manure-pack areas. A fence and gate arrangement also assists in cattle sorting. Feeding can be from a central passageway with self-unloading wagon or a mechanical feeder over a feed bunk 4 to 5 ft wide. The saving on space using the mechanical feeder will pay for the feeder. Sixteen sq ft of bedded area and 8 in. of feeding space is required per animal.

Adequate ventilation is achieved by the provision of continuous, controlled, air intakes along the eaves and a continuous ridge outlet. The ventilating force is wind combined with the chimney effect caused by the density difference between the slightly warmer air within the barn and the cold outside air. This system tends to maintain a constant outside to inside temperature difference.

There is no ceiling, but the use of 1 in. of extruded polystyrene insulation on the underside of the roof virtually eliminates condensation.

Summer ventilation and cleaning of the bedded area are possible through large sliding doors in the long walls. Frequent cleaning of the feeding area is required. Manure can be: piled outside on a paved slab with low

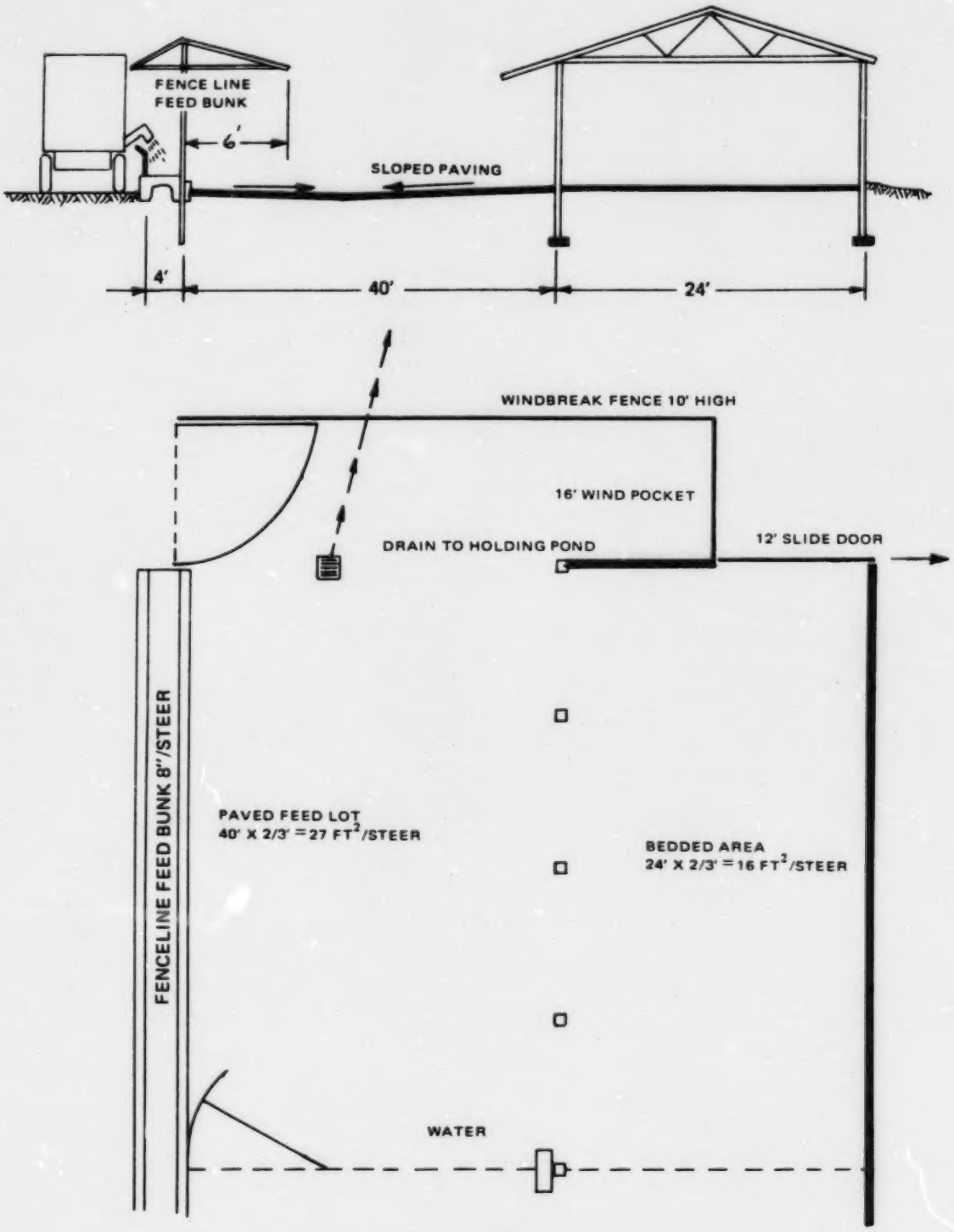


Figure 14. Open feedlot with covered bedded area.

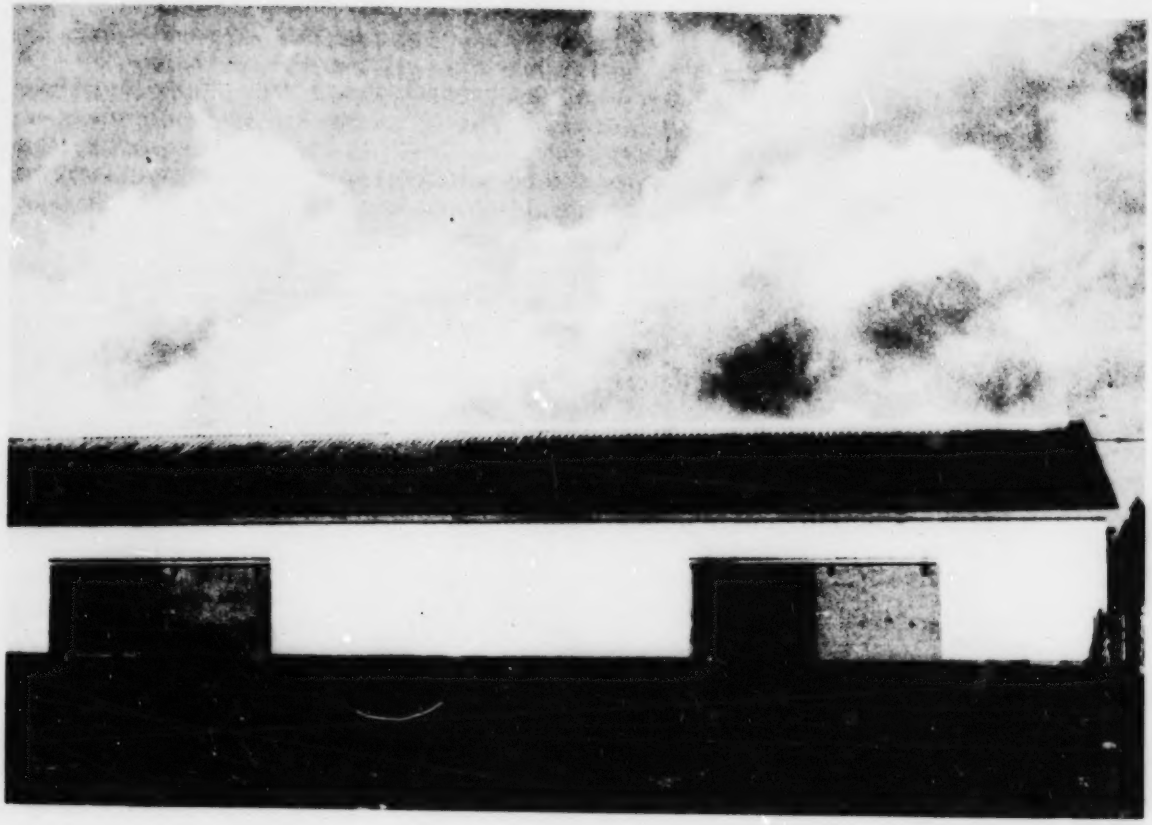


Figure 15. A modified environment barn for beef steers.

retaining walls; or on a sloping site, pushed off a ramp at the end of the barn to a paved slab with low retaining walls or directly into a spreader or truck. An alternative arrangement is to provide a slatted floor and a liquid manure handling system.

Controlled environment – The cattle are confined within a building sufficiently insulated and ventilated to maintain inside winter conditions above 35°F. These conditions are maintained by using fans and controls designed to minimize spring and fall temperature fluctuations and to control hot weather stresses.

Slatted floors, although high in cost, provide a manure handling system that requires the lowest labor costs and the best pollution control. The manure in this system is handled as a liquid, and adequate storage must be provided for a 6-month period. The tank must be designed for adequate manure agitation, which limits the distance from the pump to the farthest corner of the manure storage to 25 ft.

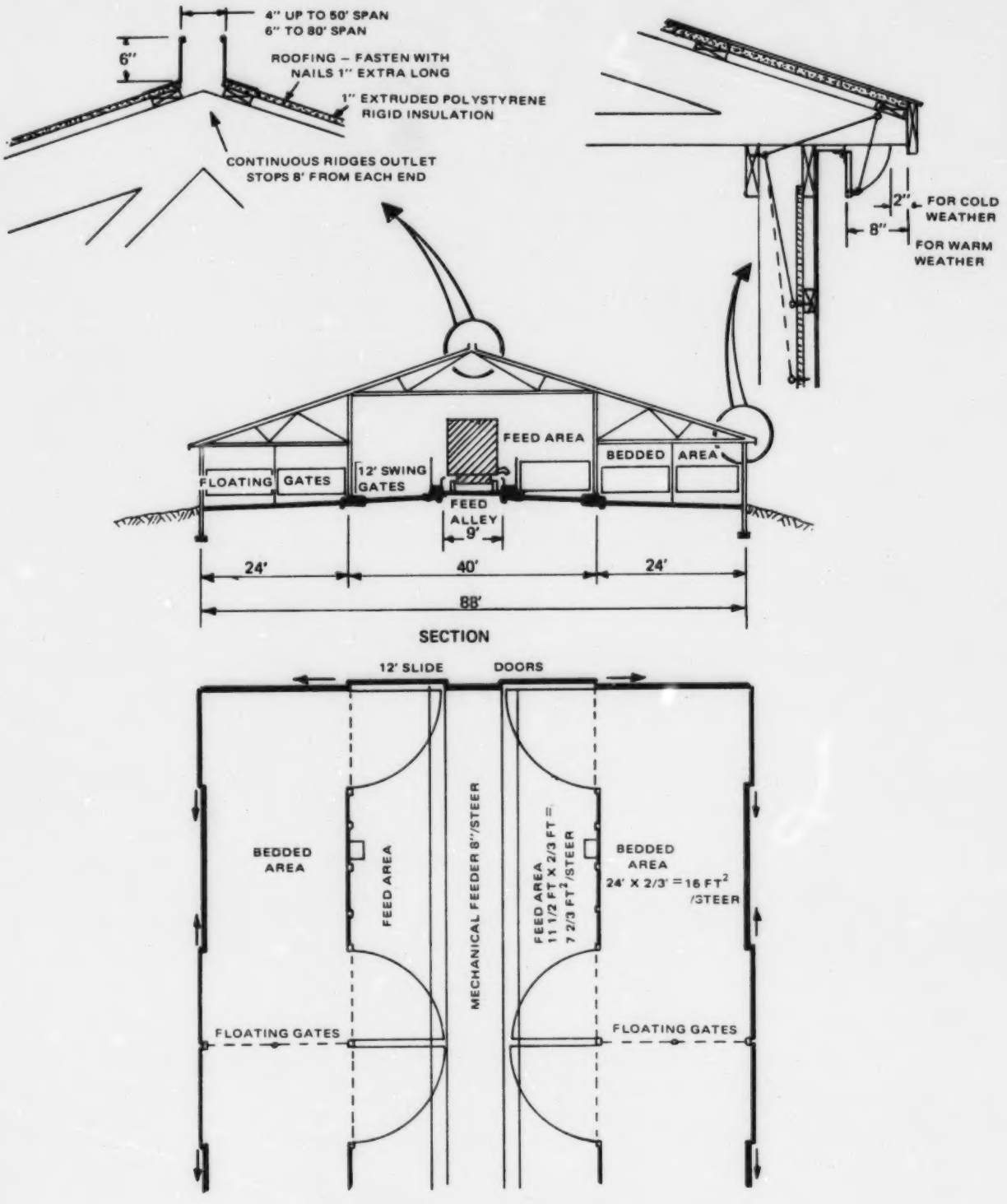
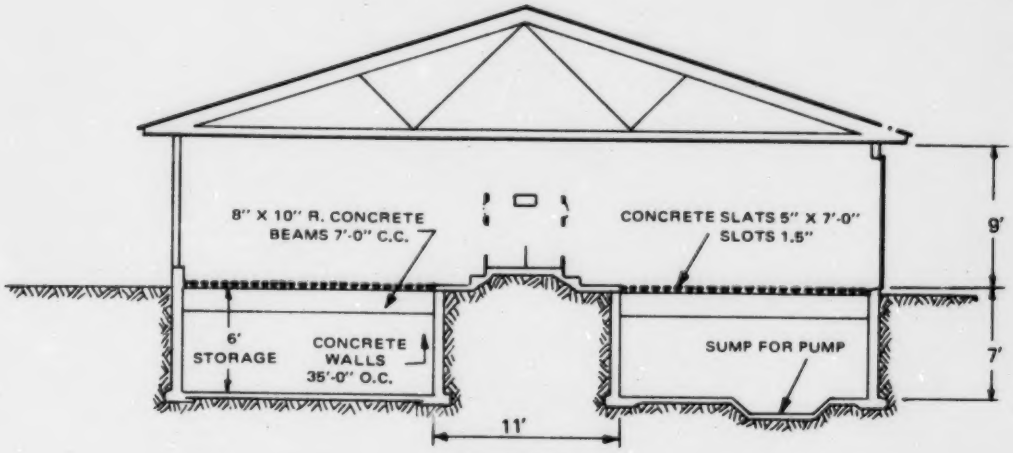


Figure 16. Modified environment beef barn with solid manure system.



SECTION 'A' – 'A'

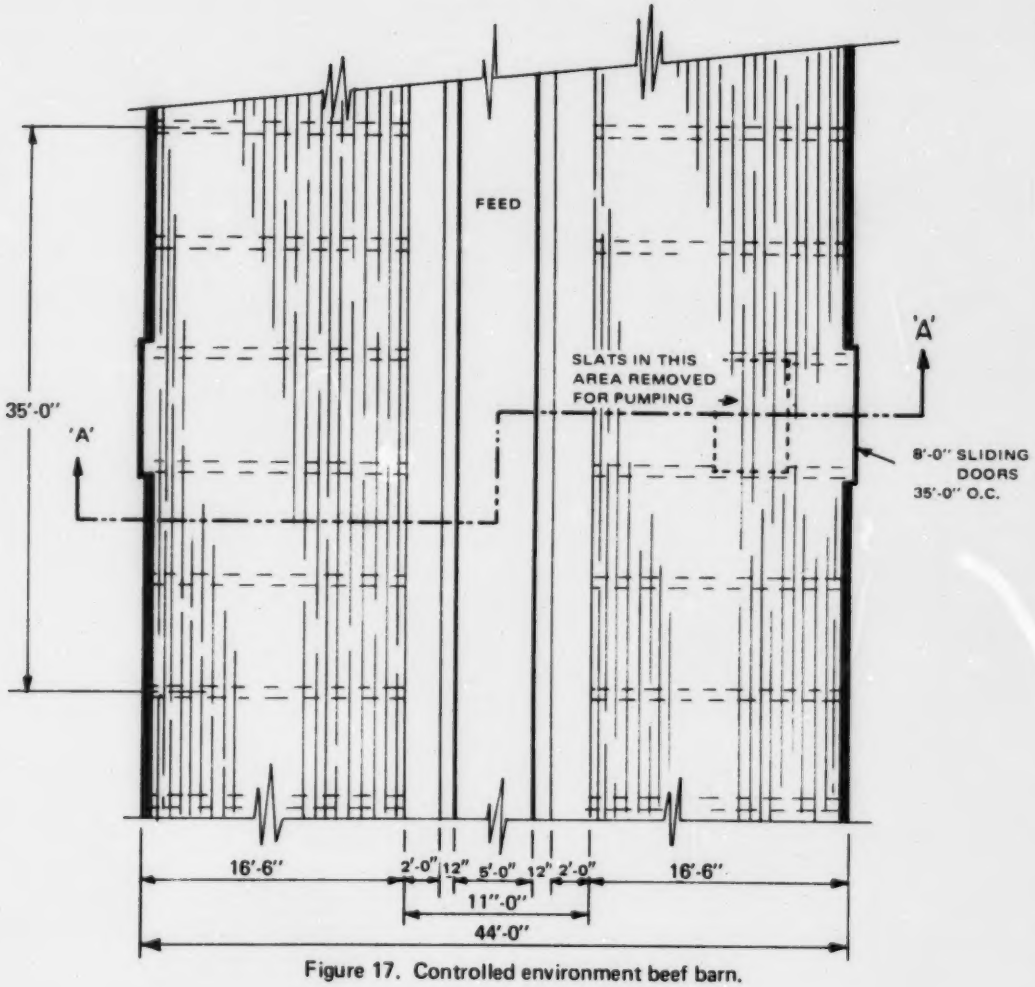


Figure 17. Controlled environment beef barn.

Twenty sq ft of pen area and 8 in. of feeding space is required per animal. This system lends itself to mechanical feeding with a feed conveyor, located over a feed bunk 4 to 5 ft wide.

Controlled environment without supplemental heating is feasible in warmer parts of the Atlantic Provinces. However, the high cost of a well-insulated barn with mechanical ventilation is probably not justified by improved animal performance alone. Where bedding is available, the best system appears to be a modified environment with a manure pack and a separate feeding area cleaned regularly.

CALCULATED MINIMUM OUTSIDE TEMPERATURES FOR GOOD VENTILATION OF WELL-INSULATED BEEF CONFINEMENT BUILDING, WITHOUT SUPPLEMENTAL HEAT

Thermostat-controlled room temperature (°F)	Minimum outside temperature for good ventilation (°F)
55	+8
50	+4.5
45	+3
40	+3

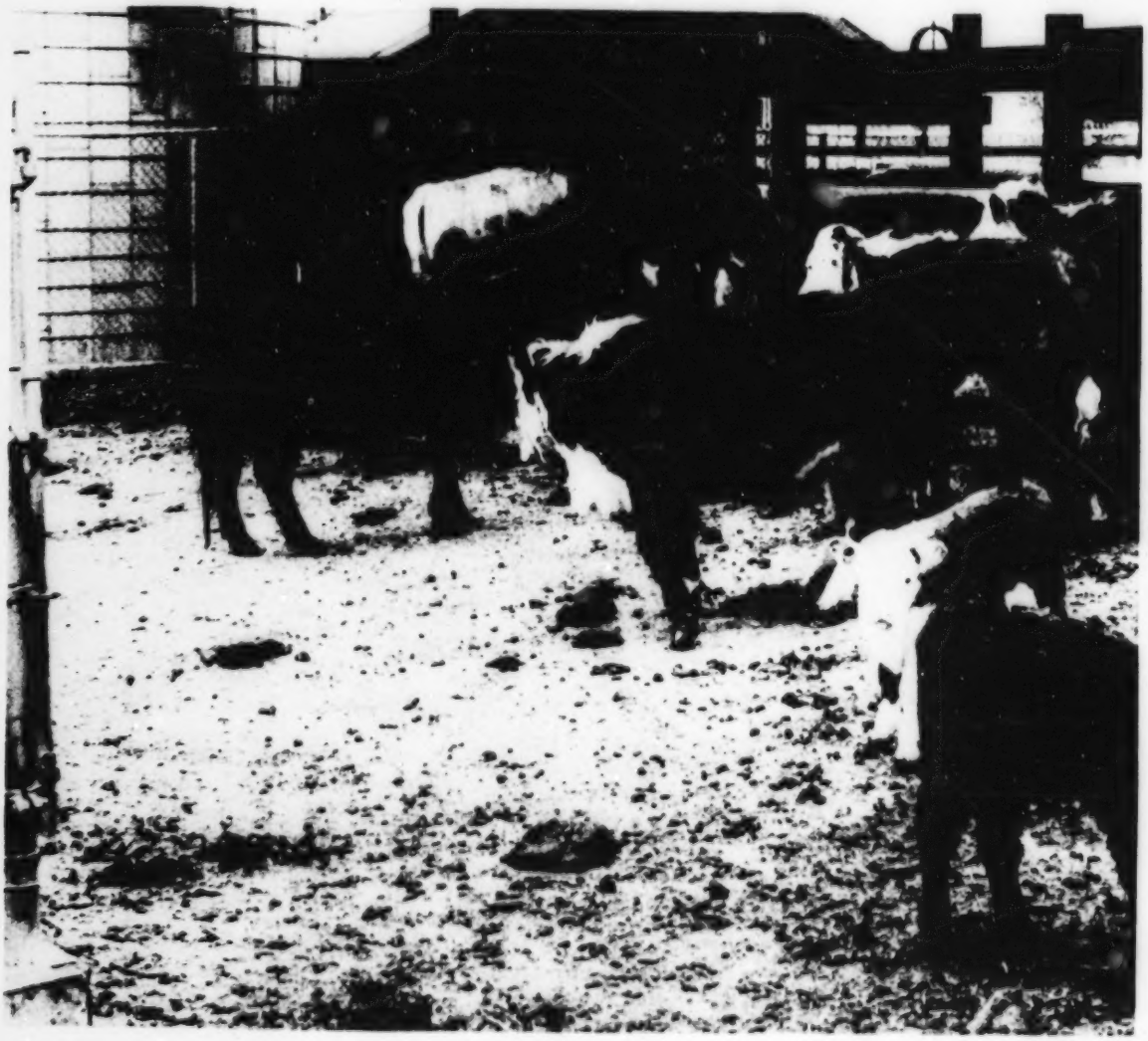


Figure 18. Silage feeding from verticle silos can be completely mechanized.

Figure 19. Silage can be self-fed from horizontal silos located under a roof.

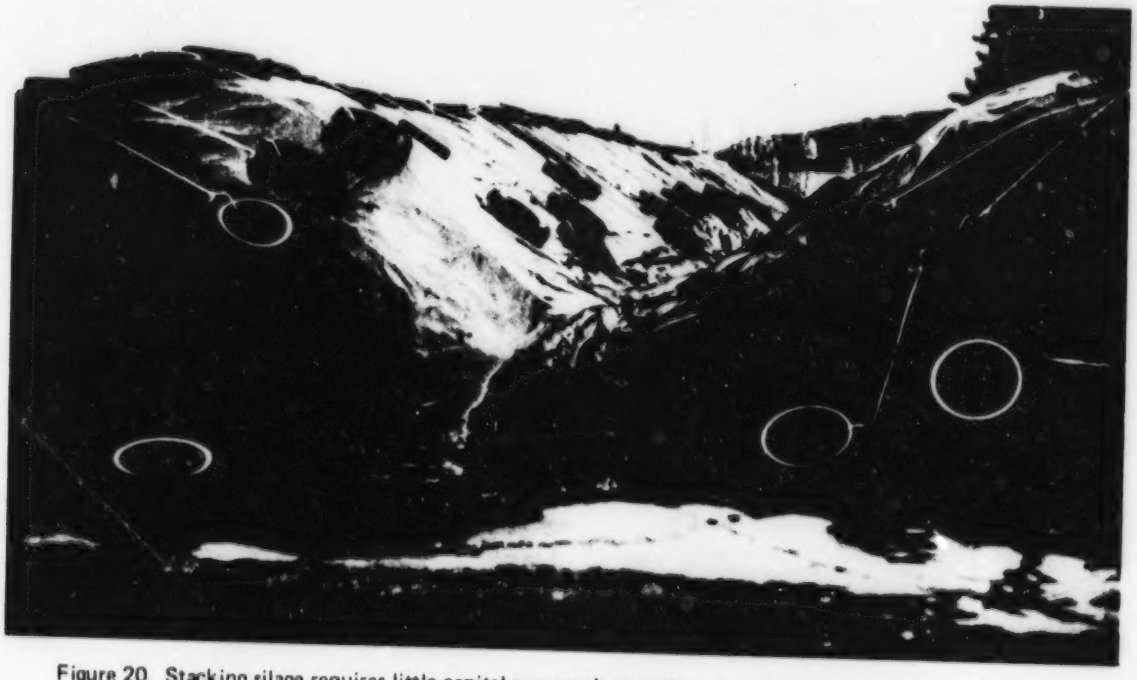


Figure 20. Stacking silage requires little capital expense but spoilage can be high if stacks are not carefully sealed with plastic film.

FEED STORAGE SYSTEMS

Both silage and hay feeding systems are popular in the Atlantic Provinces. However, a silage system is easier to mechanize than a hay system, since the chopped forage can be handled by a wider variety of transport vehicles and mechanical conveyors. The economics of tower and horizontal silos, therefore, becomes an important consideration in the design of the total beef system.

Costs of various silage storage systems must include an allowance for the feed value lost during the ensilage process and the storage period. Research indicates wide variations in dry matter loss, but the following losses are typical with good management:

	Dry matter loss (%)	Silo cost/ton capacity ($)
Sealed storage	5	35 - 45
Unsealed, tower topped with plastic film	11	12 - 10
Horizontal silo, covered with plastic film		
– 500 ton self-feeding	15	5 - 8
– 1000 ton self-feeding	12	3 - 6

Horizontal and vertical silos are competitive alternates with the horizontal silo, planned and constructed to facilitate self-feeding, having the economic advantage.

SPACE REQUIREMENTS

Too much space increases building costs, wastes bedding and manure, and involves unnecessary movement of cattle. The areas listed in Appendix Table V may be used as a guide to requirements.

Extra space is usually provided for manure and snow storage and greater animal freedom.

Traffic routes for vehicles and cattle require alleys at least 12 ft wide. Roads between two parallel fence-line bunks should be at least 30 feet wide and troughed in the center for drainage and to store plowed snow till it melts.

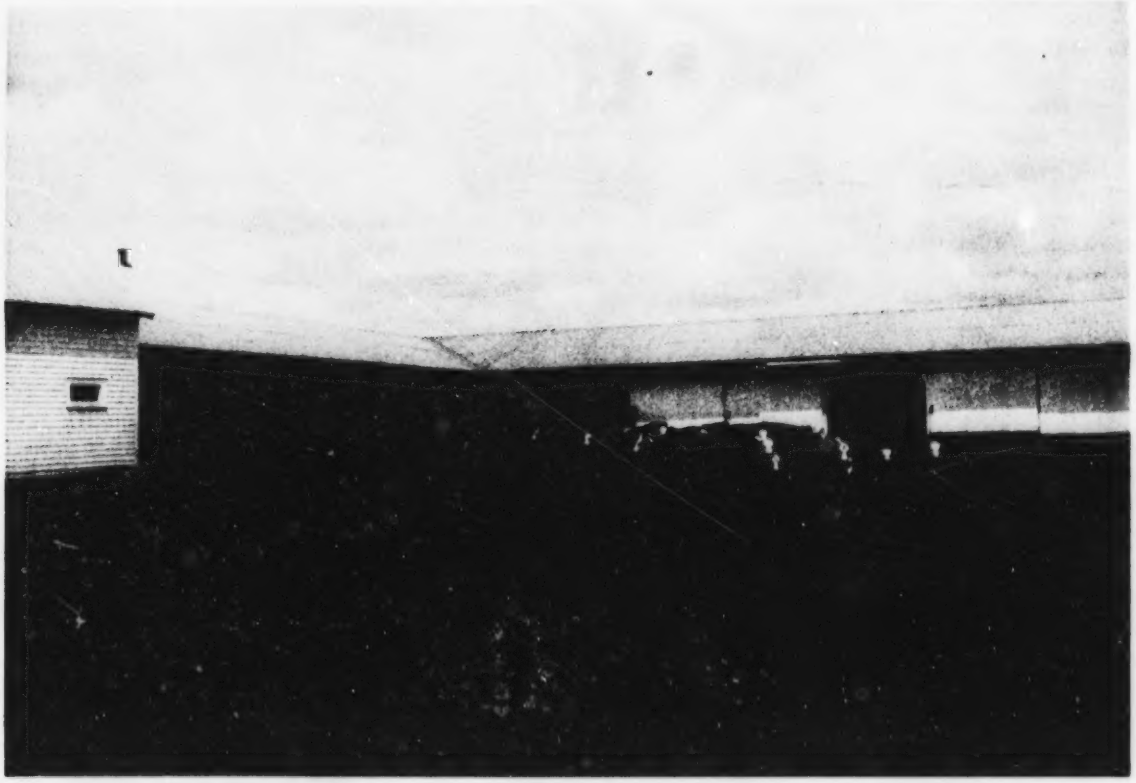


Figure 21. A hard-surfaced yard improves sanitation and reduces space required per animal.

BEEF CATTLE HANDLING FACILITIES

ESSENTIAL FEATURES

Location – It is important to choose a well-drained site, convenient to pasture, barn areas and roadways to facilitate year-round use. Sometimes, all or part of the handling equipment can be located inside a barn.

Materials – Only strong, durable materials should be used in the construction of pens and working or loading chutes. Plank or poles are both suitable for pen construction. Heavy round or square posts, treated with wood preservative, make good pen supports. The posts should be set below the level of frost penetration.

Arrangement – Animal handling equipment and pens should be arranged so that they can be used efficiently from both barn and pasture areas. Choose an arrangement that will allow handling tasks to be done as quickly and easily as possible. Equipment, such as loading chutes, is more durable if stationary; however, on some farms it may be desirable for this equipment to be portable.

Sharp Objects – All pens, chutes, etc., should be free of sharp corners and objects that may injure animals.

Floors – Floors of crowding pens and chutes should be concrete. Yard areas that are in constant use should also be hard-surfaced. Hard-surfaced areas can be cleaned quickly and easily and cattle can be worked on them any time of the year. Muddy and dirty conditions in working areas make work harder and proper sanitation more difficult.

Figure 22. Well-designed chutes for working cattle benefit both men and animals.

NECESSARY EQUIPMENT

The necessary equipment for handling beef animals when doing various management tasks is indicated below:

For larger units of 200 head or more, additional holding pens are required, together with lanes for moving cattle to and from their feeding pens. Permanent scales for weighing animals should be included for larger lots.

MANAGEMENT TASKS	CHUTE	CROWDING PEN	SORTING PEN	HEAD GATE	SQUEEZE	STOCK OR TABLE	SCALES	LOADING RAMP	BLOCKING GATE	CUTTING GATE
Treatment	X	X		X	X				X	X
Dehorning	X	X		X					X	
Castrating	X	X		X					X	
Hoof trimming	X	X				X	X		X	
Spraying	X	X							X	
Operations				X	X	X				
Sorting	X	X	X						X	X
Identification	X	X		X					X	
Weighing	X	X	X				X		X	
Breeding-A.I.	X	X		X						
Loading	X	X	X					X		

CORRAL PLANS AND COSTS

There are many different layouts for beef handling equipment but only one is shown here. It is for a small beef farm of 50-100 head. It shows some of the essential equipment that could be arranged around barn and pasture areas. This should be considered an absolute minimum in size and type of facility for a small beef herd.

The estimated cost is:

Head gate	$ 50
Material for chute, pen, gates, etc.	310
Labor	75
Total	$435

BUDGETS

COW-CALF ENTERPRISE (1)

Situation: Beef-breed cows averaging 1000 lb weight with a productive life of 6 years are maintained on medium- to high-quality hay and pasture. The cows are wintered either in a wood or a very rudimentary open-front shelter. One maternity pen is provided for each five cows. Calves are weaned from 90% of the cows wintered. The average calf weight at 7 months weaning is 450 lb; 425 lb for heifers and 475 lb for steers.

These factors should be examined closely before drawing conclusions from this budget for application in other

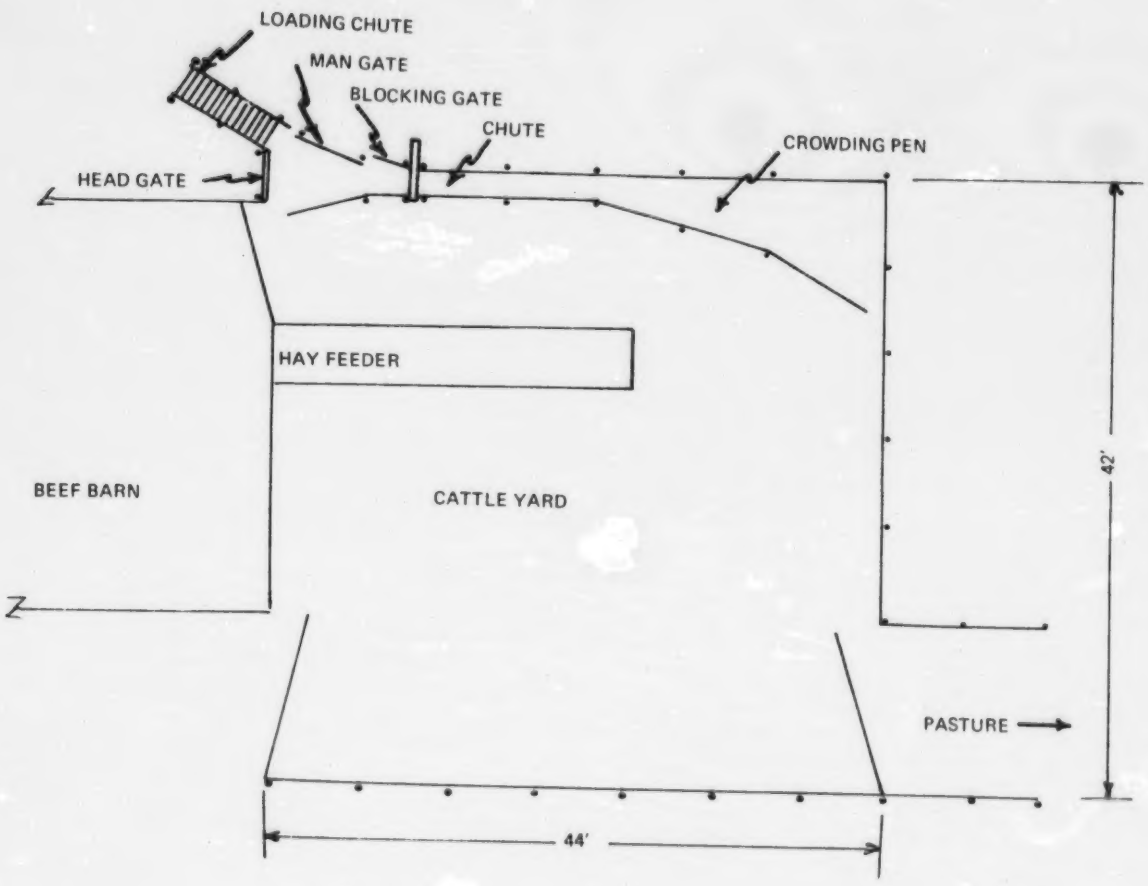


Figure 23. Corral plan for a small beef farm of 50-100 head.

situations. It is recommended that budgets be prepared for each individual situation.

Expenses:	Hay, 1.75 tons at $32 per ton (2)	$56.00
	Pasture, 0.5 acre at $50/acre (3)	25.00
	Salt and mineral	4.00
	Subtotal	$85.00
	Cow depreciation ($260-200) /6 (4)	
	Cow depreciation ($450-340) /6 (4)	18.33
	Building and fence depreciation, $70 x 0.07 (5)	4.90
	Breeding fee	8.00
	Veterinary, medicine and vitamins	6.00
	Miscellaneous	2.50
	Interest, $0.07 \times \left(\frac{450 + 340}{2} + \frac{70}{2}\right)$ (6)	30.10
	Subtotal	$69.83

Total cost, exclusive of labor and management	$154.83
Break-even price for a 450-lb calf, 90% weaning, exclusive of labor and management costs	38.2¢/lb
If calves averaged 550 lb with 90% weaning, the break-even price would be	31.3¢/lb

(1) Prepared by the Atlantic Agricultural Economics Committee.

(2) Hay is 10% crude protein and 54% TDN on a 100% dry-matter basis. The quoted weight of feed is based on 90% dry matter. The cost per ton of hay includes the

costs of storage, feeding and interest over the winter feeding period.

(3) Pasture yield is 6,000 lb of dry matter per acre; its TDN content is 70%. An allowance of 600 lb of dry matter is made for each calf.

(4) Purchase and sale values of the cows are $450 and $340, respectively. Farm-raised replacements can be charged to the cow herd either at production cost or estimated market value. Cow death losses are taken into account in the sale value.

(5) New investment per cow for buildings and fences is $70. Depreciation and repair rates are 5 and 2%, respectively.

(6) Interest at 7% is charged on the average values of the cows, buildings and fences.

BEEF FEEDERS (1)

Situation: Medium- to good-quality, beef-breed or beef-dairy feeders are housed in modern conventional drylot facilities. An average daily gain of 2.2 lb is expected on the basis of the quality of the animals and the amounts of feed listed below.

In the following budgets, break-even sale prices for animals fed corn silage are lower than for those fed grass silage. It should not be inferred that this is always the case. Changes in the relative prices of silages and grains used in the feeding program would change the break-even price. These factors should be examined closely before drawing conclusions from the budgets for application in other situations. It is recommended that budgets be prepared for each individual situation.

Yardage costs cover overhead and labor requirements of the animals. The quoted figure is a typical custom rate.

I Feeders: 450 to 1050 lb; 274 days on feed; average daily gain 2.2 lb; corn silage and barley.

Expenses:	Corn silage, 2.25 tons at $28/ton (2)	$ 63.00
	Barley, 7.9 cwt at $5/cwt (3)	39.50
	Urea, 75 lb at 8¢/lb (4)	6.00
	Salt, mineral	3.00
	Subtotal	$111.50
	Veterinary, medicine, vitamins	$ 3.75
	Yardage, 274 days at 10¢/day (5)	27.40
	Feed grinding and mixing, 7.9 cwt at 25¢/cwt	1.98
	Death loss, 2% of mean value ($322)	6.44
	Interest, 0.07 x 274/365 x purchase value ($225)	11.81
	Subtotal	$ 51.38
	Total cost of gain	$162.88

Break-even sale price =

$$\frac{450 \times \text{purchase price (\$/lb)} + \text{cost of gain (6)}}{1050}$$

If the purchase price is $0.50/lb and the cost of gain is $162.88, the break-even sale price (nil return to management) is 36.9/lb.

II Feeders: 450 to 1050 lb; 274 days on feed; average daily gain 2.2 lb; grass silage and barley.

Expenses:	Grass silage, 2.25 tons at $30/ton (7)	$ 67.50
	Barley, 10.8 cwt at $5/cwt (3)	54.00
	Salt, mineral	3.00
	Subtotal	$124.50
	Veterinary, medicine, vitamins	$ 3.75
	Yardage, 274 days at 10¢/day (5)	27.40
	Feed grinding and mixing, 10.8 cwt at 25¢/cwt	2.70
	Death loss, 2% of mean value ($322)	6.44
	Interest, 0.07 x $\frac{274}{365}$ x purchase value ($225)	11.81
	Subtotal	$ 52.10
	Total cost of gain	$176.60

Break-even sale price =

$$\frac{450 \times \text{purchase price (\$/lb)} + \text{cost of gain (6)}}{1050}$$

If the purchase price is $0.50/lb and the cost of gain is $176.60, the break-even sale price (nil return to management) is 38.2¢/lb.

III Feeders: 750 to 1050 lb; 137 days on feed; average daily gain 2.2 lb; corn silage and barley.

Expenses:	Corn silage, 1.36 tons at $28/ton (2)	$ 38.08
	Barley, 4.2 cwt at $5/cwt (3)	21.00
	Urea, 45 lb at 8¢/lb (4)	3.60
	Salt, mineral	1.50
	Subtotal	$ 64.18

Veterinary, medicine, vitamins	$ 2.50
Yardage, 137 days at 10¢/day (5)	13.70
Feed grinding and mixing, 4.2 cwt at 25¢/cwt	1.05
Death loss, 1% of mean value ($375)	3.75
Interest, 0.07 x $\frac{137}{365}$ x purchase value ($330)	8.65
Subtotal	$29.65
Total cost of gain	$93.83

Break-even sale price =

$$\frac{750 \times \text{purchase price (\$/lb)} + \text{cost of gain (6)}}{1050}$$

If the purchase price is $0.44/lb and the cost of gain is $93.83, the break-even sale price (nil return to management) is 40.4¢/lb.

IV Feeders: 750 to 1050 lb; 137 days on feed; average daily gain 2.2 lb; grass silage and barley.

Expenses: Grass silage, 1.36 tons at $30/ton (7)	$40.80
Barley, 5.9 cwt at $5/cwt (3)	29.50
Salt, mineral	1.50
Subtotal	$ 71.80
Veterinary, medicine, vitamins	$ 2.50
Yardage, 137 days at 10¢/day (5)	13.70
Feed grinding and mixing, 5.9 cwt at 25¢/cwt	1.48
Death loss, 1% of mean value ($375)	3.75
Interest, 0.07 x $\frac{137}{365}$ x purchase value ($330)	8.65
Subtotal	$ 30.08
Total cost of gain	$101.88

Break-even sale price =

$$\frac{750 \times \text{purchase price (\$/lb)} + \text{cost of gain (6)}}{1050}$$

If the purchase price is $0.44/lb and the cost of gain is $101.88, the break-even sale price (nil return to management) is $41.1¢/lb.

(1) Prepared by the Atlantic Agricultural Economics Committee.

(2) Corn silage is 8% crude protein and 65% TDN on a 100% dry-matter basis. The quoted weight of feed is based on 90% dry matter. The cost per ton of corn silage includes storage, feeding and interest over the storage period.

(3) Barley is 13% crude protein and 83% TDN on a 100% dry-matter basis. The quoted weight of feed is based on 86% dry matter.

(4) Urea is added to corn silage at the rate of 10 lb per ton of wet silage at the time of ensiling.

(5) Covers depreciation, interest, repairs, taxes and insurance on structures and equipment, insurance on cattle, labor and bedding.

(6) All prices are F.O.B. feedlot.

(7) Grass silage is 12% crude protein and 60% TDN on a 100% dry-matter basis. The quoted weight of feed is based on 90% dry matter. The cost per ton of grass silage includes storage, feeding and interest over the storage period.

APPENDIX 1

NORMAL TEMPERATURES, HEAT AND GESTATION OF BEEF ANIMALS

	Normal rectal temperature range – degrees F.	Regularity of heat periods		Duration of heat periods	Length of gestational period	
		Av. days	Variation days		Av. days	Variation days
Beef	98.0 to 102.4	21	16-24	8-30 hr	282	274-291

APPENDIX 2

GESTATION TABLE FOR COWS

The gestation period of cows is subject to considerable variation, and is likely to depend upon heredity, environment and breed. The generally accepted average of 282 days was used to calculate this table.

Service date	Approx. birth date	Service date	Approx. birth date	Service date	Approx. birth date
Jan. 1	Oct. 10	May 7	Feb. 13	Sept. 10	June 19
8	17	14	20	17	26
15	24	21	27	24	July 3
22	31	28	Mar. 6	Oct. 1	10
29	Nov. 7	June 4	13	8	17
Feb. 5	14	11	20	15	24
12	21	18	27	22	31
19	28	25	Apr. 3	29	Aug. 7
26	Dec. 5	July 2	10	Nov. 5	14
Mar. 5	12	9	17	12	21
12	19	16	24	19	28
19	26	23	May 1	26	Sept. 4
26	Jan. 2	30	8	Dec. 3	11
Apr. 2	9	Aug. 6	15	10	18
9	16	13	22	17	25
16	23	20	29	24	Oct. 2
23	30	27	June 5	31	9
30	Feb. 6	Sept. 3	12		

APPENDIX 3

ESTIMATING WEIGHT OF CATTLE FROM HEART GIRTH
I – APPROXIMATE WEIGHTS OF BEEF CATTLE OF GOOD GRADE

Heart girth, in.	Weight, lb	Heart girth, in.	Weight, lb	Heart girth, in.	Weight, lb
30	78	50	372	70	910
30 1/2	82	50 1/2	382	70 1/2	926
31	87	51	393	71	942
31 1/2	91	51 1/2	404	71 1/2	959
32	96	52	415	72	977
32 1/2	101	52 1/2	426	72 1/2	994
33	106	53	437	73	1,011
33 1/2	112	53 1/2	449	73 1/2	1,029
34	118	54	461	74	1,047
34 1/2	123	54 1/2	472	74 1/2	1,065
35	129	55	484	75	1,083
35 1/2	135	55 1/2	496	75 1/2	1,100
36	141	56	508	76	1,117
36 1/2	147	56 1/2	520	76 1/2	1,135
37	153	57	533	77	1,154
37 1/2	159	57 1/2	545	77 1/2	1,173
38	166	58	558	78	1,192
38 1/2	173	58 1/2	571	78 1/2	1,211
39	181	59	585	79	1,230
39 1/2	188	59 1/2	598	79 1/2	1,249
40	195	60	611	80	1,269
40 1/2	202	60 1/2	624	80 1/2	1,288
41	210	61	637	81	1,308
41 1/2	218	61 1/2	651	81 1/2	1,328
42	226	62	665	82	1,348
42 1/2	234	62 1/2	679	82 1/2	1,368
43	242	63	693	83	1,388
43 1/2	250	63 1/2	708	83 1/2	1,409
44	259	64	723	84	1,430
44 1/2	267	64 1/2	738	84 1/2	1,451
45	276	65	753	85	1,472
45 1/2	285	65 1/2	768	85 1/2	1,493
46	294	66	783	86	1,514
46 1/2	303	66 1/2	798	86 1/2	1,535
47	313	67	814	87	1,557
47 1/2	322	67 1/2	829	87 1/2	1,578
48	332	68	845	88	1,600
48 1/2	342	68 1/2	861	88 1/2	1,622
49	352	69	877	89	1,644
49 1/2	362	69 1/2	893	89 1/2	1,667

Although not absolute, these tables are practical for the average livestock feeder or breeder where livestock scales are not available. The degree of error is usually less than 5%.

II – APPROXIMATE WEIGHTS OF DUAL-PURPOSE CATTLE OF MEDIUM FLESH

Heart girth, in.	Weight, lb	Heart girth, in.	Weight, lb	Heart girth, in.	Weight, lb
30	91	50	390	70	975
30 1/2	95	50 1/2	401	70 1/2	993
31	99	51	412	71	1,011
31 1/2	103	51 1/2	424	71 1/2	1,030
32	108	52	436	72	1,049
32 1/2	113	52 1/2	448	72 1/2	1,068
33	118	53	460	73	1,087
33 1/2	123	53 1/2	472	73 1/2	1,107
34	128	54	484	74	1,127
34 1/2	133	54 1/2	496	74 1/2	1,147
35	139	55	509	75	1,167
35 1/2	145	55 1/2	522	75 1/2	1,186
36	151	56	535	76	1,205
36 1/2	157	56 1/2	548	76 1/2	1,226
37	163	57	562	77	1,247
37 1/2	169	57 1/2	575	77 1/2	1,267
38	176	58	589	78	1,288
38 1/2	183	58 1/2	603	78 1/2	1,310
39	190	59	618	79	1,332
39 1/2	197	59 1/2	632	79 1/2	1,353
40	205	60	647	80	1,374
40 1/2	212	60 1/2	661	80 1/2	1,396
41	220	61	676	81	1,418
41 1/2	228	61 1/2	691	81 1/2	1,440
42	236	62	707	82	1,463
42 1/2	244	62 1/2	722	82 1/2	1,485
43	253	63	737	83	1,508
43 1/2	262	63 1/2	753	83 1/2	1,531
44	271	64	770	84	1,555
44 1/2	279	64 1/2	786	84 1/2	1,578
45	288	65	802	85	1,601
45 1/2	297	65 1/2	818	85 1/2	1,624
46	307	66	834	86	1,648
46 1/2	317	66 1/2	850	86 1/2	1,672
47	327	67	869	87	1,697
47 1/2	337	67 1/2	886	87 1/2	1,721
48	347	68	903	88	1,745
48 1/2	358	68 1/2	921	88 1/2	1,770
49	369	69	939	89	1,796
49 1/2	379	69 1/2	957	89 1/2	1,821

This table for dual-purpose cattle is best to use on weights of feeder cattle unless they grade choice or fancy.

SOURCE: Bureau of Animal Husbandry, U.S.D.A.

APPENDIX 4

APPROXIMATE YIELD OF WHOLESALE CUTS OF A BEEF CARCASS

Front Quarter		Hind Quarter	
Chuck	25%	Round	20%
Prime rib	11%	Rump	5%
		Sirloin butt	8%
Plate, Brisket, Shank	15%	Short loin	10%
		Shank, Flank	6%
Total	51%	Total	49%

APPROXIMATE YIELD OF STEAKS IN A CHOICE BEEF CARCASS

Porterhouse, T-bone, club steaks	8%
Sirloin steaks	7%
Round steaks	12%
Total	27%

SOURCE: *Beef Production in Nova Scotia*

APPENDIX 5

ACCOMMODATION FOR BEEF CATTLE

Accommodation	Cows and bred heifers	Yearlings	500-lb calves
Feedlot (without shed)			
hard-surfaced	80 sq ft	45 sq ft	40 sq ft
soil	300 sq ft	250 sq ft	150 sq ft
Feedlot (with shed)			
lot area			
– hard-surfaced	50 sq ft min.	25 sq ft min.	25 sq ft min.
– soil	300 sq ft min.	250 sq ft min.	150 sq ft min.
shed area			
– floor area	30 sq ft min.	20 sq ft min.	15 sq ft min.
– clear height	10 ft min.	10 ft min.	10 ft min.
Slotted floors			
space/animal	30 sq ft	20 sq ft	12 sq ft
% of floor area slotted	100	100	100
Maternity pens (additional area)	1 pen /20 cows 10 ft by 10 ft minimum (not slotted)		
Water surface area	1 sq ft/25 head	1 sq ft/25 head	1 sq ft/30 head
Bedding storage (except for slotted floors)	8 lb/head-day	6 lb/head-day	4 lb/head-day

APPENDIX 5 (Cont'd)

ACCOMMODATION FOR BEEF CATTLE (Concl'd)

Accommodation	Cows and bred heifers	Yearlings	500-lb calves
Feed bunk			
length/head			
– simultaneous feeding	2 ft 2 in.	1 ft 8 in.	1 ft 6 in.
– full feeding			
– roughage	8 in.	8 in.	6 in.
– mill feed	3 in.	3 in.	2 in.
height at throat	18 in.	18 in.	18 in.
max. reach (top of throat board to bottom inside corner)	34 in.	30 in.	24 in.
Feed storage			
hay, without silage	25 lb/head-day (maintenance only)	15 lb/head-day (maintenance only)	12 lb/head-day (maintenance only)
	or		
silage, without hay	75 lb/head-day (maintenance only)	$4^1/_2$-5 lb/day per 100 lb live wt. (fattening).	35lb/head-day (maintenance only)
grain and concentrate	Cows: no grain Fattening 2-year olds; $1^1/_2$-2 lb/day/100 lb liveweight	May substitute grain for hay at 1 lb grain/ $1^1/_2$ lb hay	$1^1/_2$-2 lb/head-day

SOURCE: *Canadian Code for Farm Buildings* NRC 11065, 1970, Ottawa

APPENDIX 6

SOME UNIT PRICES USED IN ESTIMATING BUILDING COSTS FOR BEEF HOUSING

Item	Price ($)/unit
Feedlot grading and paving	.50/sq ft paved area
Feedlot fencing, 4 to 5 ft high	6.00/ft
Feedlot windbreak fencing 10 ft high	12.00/ft
Fenceline feed bunk	20.00/ft
Double feed bunk with catwalk	30.00/ft
Mechanical feeder	20.00/ft
Pole barn (not insulated)	1.60/sq ft floor area
Insulation for modified environment	.25/sq ft floor area
Insulation for controlled environment	.60/sq ft floor area
Concrete slotted floor	1.40/sq ft floor area
Liquid manure storage (concrete)	.60/cu ft volume

APPENDIX 7

ESTIMATED INVESTMENT IN HOUSING AND FIXED EQUIPMENT FOR FEEDING BEEF

Type of housing	Investment ($/steer)
Open feedlot with windbreak fencing	20
Open paved feedlot, covered bedding area	80
Modified environment, wagon feeding	96
Modified environment, conveyor feeding	96
Modified environment, slotted floor	165
Controlled environment, slotted floor	180

METRIC EQUIVALENTS

LENGTH

inch	= 2.54 cm	millimetre	= 0.039 in.
foot	= 0.3048 m	centimetre	= 0.394 in.
yard	= 0.914 m	decimetre	= 3.937 in.
mile	= 1.609 km	metre	= 3.28 ft
		kilometre	= 0.621 mile

AREA

square inch	= 6.452 cm^2	cm^2	= 0.155 sq in.
square foot	= 0.093 m^2	m^2	= 1.196 sq yd
square yard	= 0.836 m^2	km^2	= 0.386 sq mile
square mile	= 2.59 km^2	ha	= 2.471 acres
acre	= 0.405 ha		

VOLUME (dry)

cubic inch	= 16.387 cm^3	cm^3	= 0.061 cu in.
cubic foot	= 0.028 m^3	m^3	= 31.338 cu ft
cubic yard	= 0.765 m^3	hectolitre	= 2.8 bu
bushel	= 36.368 litres	m^3	= 1.308 cu yd
board foot	= 0.0024 m^3		

VOLUME (liquid)

fluid ounce (Imp)	= 28.412 ml	litre	= 35.2 fluid oz
pint	= 0.568 litre	hectolitre	= 22 gal
gallon	= 4.546 litres		

WEIGHT

ounce	= 28.349 g	gram	= 0.035 oz avdp
pound	= 453.592 g	kilogram	= 2.205 lb avdp
hundredweight (Imp)	= 45.359 kg	tonne	= 1.102 short ton
ton	= 0.907 tonne		

PROPORTION

1 gal/acre	= 11.232	1 litre/ha	= 14.24 fluid oz/acre
1 lb/acre	= 1.120 kg/ha	1 kg/ha	= 14.5 oz avdp/acre
1 lb/sq in.	= 0.0702 kg/cm^3	1 kg/cm^3	= 14.227 lb/sq in.
1 bu/acre	= 0.898 hl/ha	1 hl/ha	= 1.112 bu/acre